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THE TECHNICAL MAGAZINE FOR MANUFACTURERS OF PAINT, VARNISH, LACQUER AND OTHER SYNTHETIC FINISHES

DECEMBER

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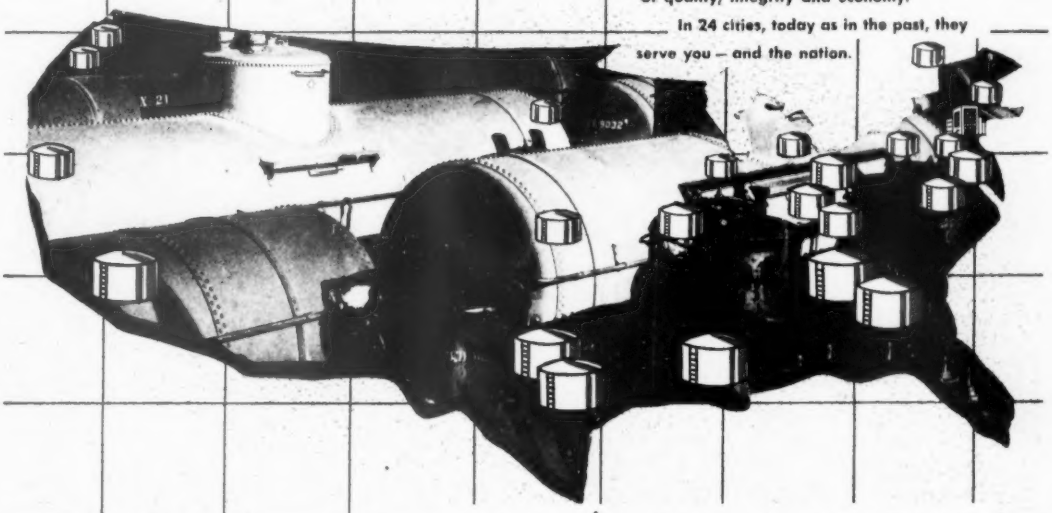

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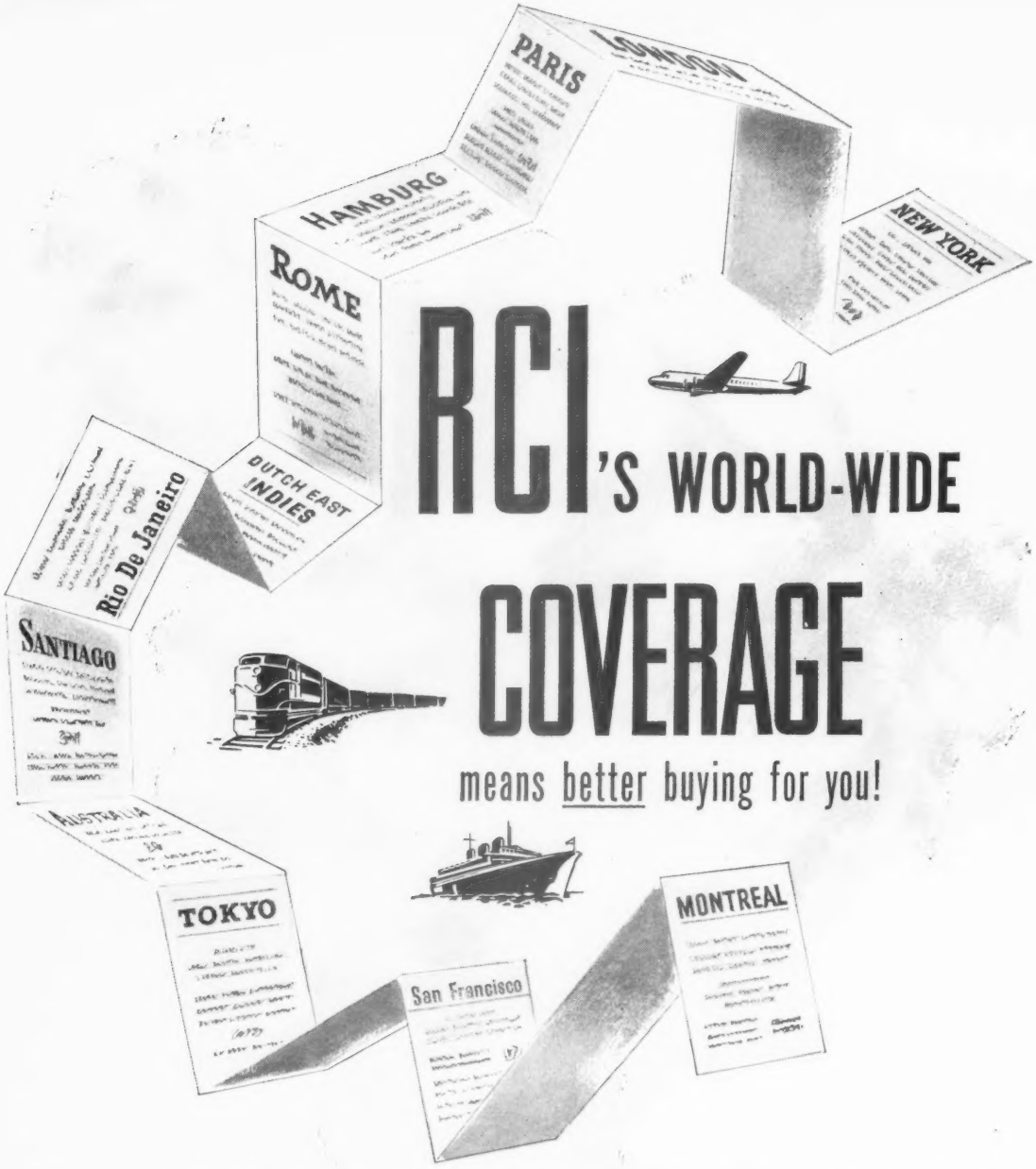

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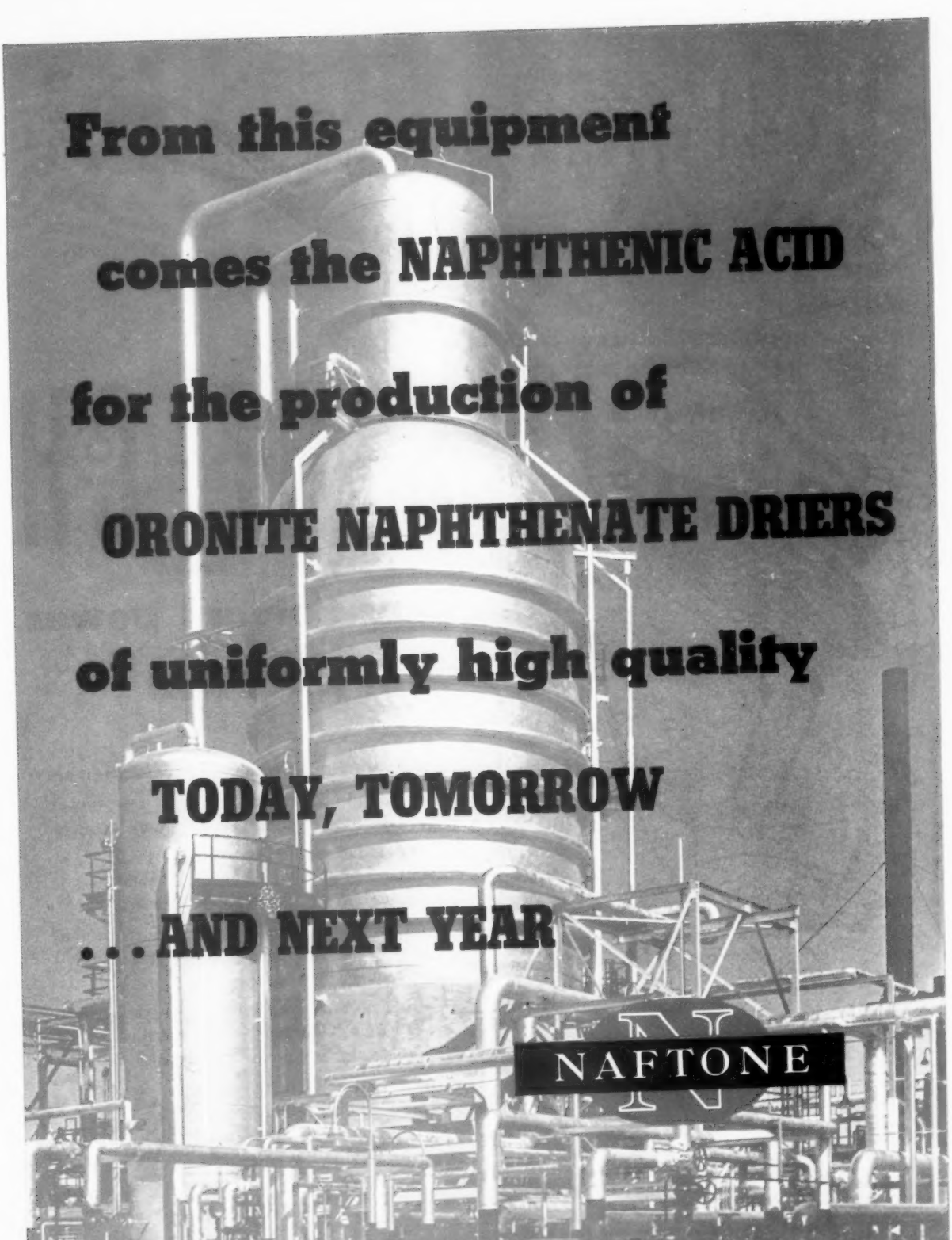
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VOL. 41 DECEMBER 1951 NO. 12

Powell Magazines Inc.
Wishes You
A Merry Christmas
and
A Happy New Year

FEATURES

Phenolic Resins and Their Varnishes, *by Barge Golding* 12

Vinyls for Surface Coatings, Part V, *by Walter Hanau* 14

PVP Candid Shots of Paint Conventions 24

Subject Index to Vol. 41, Jan.–Dec. 1951 48

Author's Index to Vol. 41, Jan.–Dec. 1951 48

DEPARTMENTS

Comment 7
News Digest 20
New Products 24
Abstracts 30
Calendar of Events 39
Patents 41
Technical Bulletins 46

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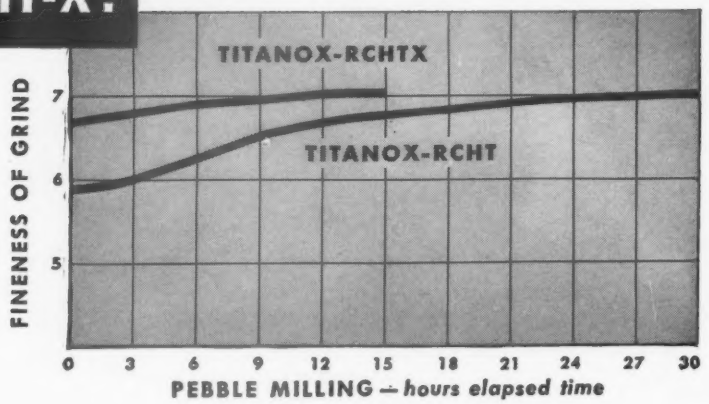
A. Easy mixing and grinding for high gloss in rutile-calcium pigment.



The accompanying chart presents an example of the inordinately fast grinding of TITANOX-RCHTX (rutile-calcium pigment) to enamel fineness in a pebble mill.

This pigment may be ground even faster than TITANOX-RCHT itself an easy grinding pigment. "X" denotes TITANOX-RCHT modified for faster mixing and grinding to fine dispersity to yield high gloss.

Although pebble milling is cited above, the easy mixing and grinding qualities of TITANOX-RCHTX are revealed strikingly in roller mills, and all other types of pigment dispersing machinery.

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Of course, TITANOX-RCHTX is also suitable for semi-glosses and flats. Under some grinding conditions and in some formulations, care must be exercised in replacing TITANOX-RCHT with TITANOX-RCHTX in semi-glosses and flats, for gloss and sheen may be increased by the well dispersed TITANOX-RCHTX. Often, these pigments are interchangeable, with economy in mixing and grinding favoring the "X" type.

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Editorial Comment

Production Men and Sales Ideas

MAYBE you have never thought about how closely you, as a production or technical man, are connected with your sales department. But the connection exists and it's a firm and binding one.

Sales must sell the products you manufacture. You, in turn, have to make those products as good as you can within the limits that abilities, facilities and economics dictate.

If you make a good product and it's sold properly, you, your sales associates and your company prosper. That's why you'll usually find that the more successful companies operate their production and sales departments as a closely cooperating team.

That's also why PAINT AND VARNISH PRODUCTION wants to bring a sales opportunity to your attention. We think you'll help yourself and your company if you ask your sales people to investigate the following idea:

We think many paint manufacturers are missing a profitable bet in not making and offering certain specialized finishes for maintenance of industrial interiors.

For example, many industrial plants, according to surveys we have made, are greatly interested in mildew resistant paints. They call their paint supplier and find he does not make such a product. Sometimes the customer is told to buy a mildewcidal chemical to mix in the paint himself. But the user prefers a complete, factory-formulated product—thus, the sale is lost and the buyer is disappointed.

The same is true for odorless paints. A good odorless paint will sell in a lot of industrial locations where no paint is being used at present because of the fear of in-process product contamination.

Urge your sales departments to go after this specialty business. You can certainly produce the necessary finishes. And by cooperating with the sales members of your company team, we think you can all turn this idea into a real money maker.

New Approach to Plasticization Studies

AT the recent meeting of the Electron Microscope Society in Philadelphia, E. B. Bradford of Dow Chemical presented an interesting paper on the use of the electron microscope in studying the mechanism of plasticization, particularly the action of plasticizers in converting polymer granules into a continuous film. Studies of both plasticized and unplasticized polymers under the electron microscope were made.

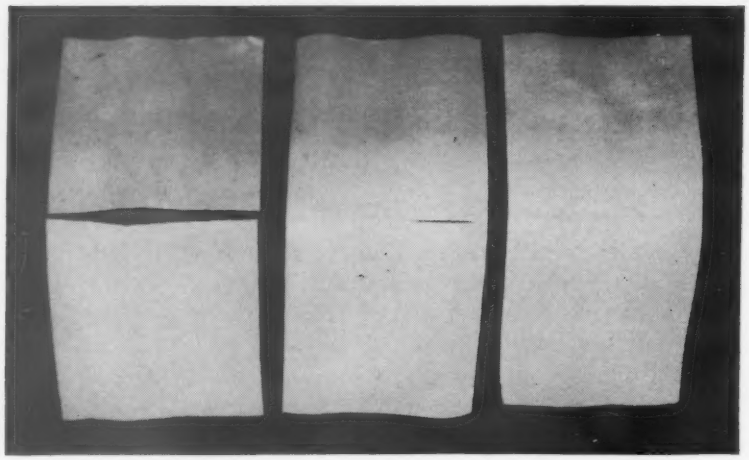
It was found that unplasticized Saran latices which are powdery and will not form a film without heating give the appearance of a surface of spherical particles of various sizes having no apparent ordered arrangement. As plasticizer is added to the polymer the spheres appear to flatten and coalesce but retain their circular shape until at some transition point the individual particles disappear and the surface becomes a continuous sheet. Bradford attributes this type of plasticization to some surface tension phenomena.

In studying the plasticization of polystyrene, it was noted that the first visible effect of adding plasticizer to this material was the ordering of the polymer spheres into a close packed arrangement. Bradford suggests that the plasticizing mechanism may be different in this case with the plasticizer serving as a "lubricant" to stimulate orientation.

It was found that polyvinyl polymers have an ordered packing even when not plasticized. The particles of these particular polymers have a uniform size and usually arrange themselves in a dense hexagonal array although cubical packing was also observed. This arrangement does not give the film any strength and it is still powdery and brittle when unplasticized.

In most cases, polyvinyl materials are preplasticized by adding plasticizer to the charge before polymerization. The film found by this method looks like a mass of grub worms. Plasticization in this instance involves a more basic structural alteration of the polymer.

"lead"-stabilized house paints have sustained flexibility



Three paint films (typical commercial formulations) exposed to accelerated weathering for the same period, and each bent over a 1/32-inch mandrel. White lead content, left to right, is 0.0%, 12.5%, and 35.0%. The vehicle in each case was identical.

"LEAD" LENGTHENS THE LIFE OF PAINT BECAUSE:

It Stabilizes . . .
neutralizes acidic compounds resulting from the decomposition of the vehicle—prevents the film from becoming soft or liquefying.

It Plasticizes . . .
forms lead soaps which increase film flexibility.

It Strengthens . . .
flexible, spiney lead soap particles mechanically reinforce the film and increase elastic strength.

It Resists Water . . .
paint films with an optimum lead pigment content absorb only a small fraction as much water as they otherwise would.

It Limits Oil Penetration . . .
more of the vehicle remains in the film where it is needed; less is absorbed in the substrata.

It Improves Appearance . . .
by controlling chalking and inhibiting mildew.

Another positive demonstration of the superior flexibility of white lead house paints over other types was recently conducted at the request of the White Lead Technical Committee of Lead Industries Association. The results, shown here, confirm those of other standard test methods, which consistently have indicated that the greater plasticity and stability of paints containing white lead result in a more flexible, longer lasting film.

"Lead" *stabilizes* paint by providing a means of capturing destructive acidic compounds as they form during the normal weathering of the vehicle. Left alone, these compounds soften the film, thus greatly shorten its life. In lead pigment paints they are immobilized, through their reaction with the pigment, to form useful, stable, insoluble lead salts in the film.

"Lead" *plasticizes* paint by forming spiney, interlocking (felted) lead soaps through reaction with the vehicle. These compounds are ideal plasticizers, allowing the film to adhere closely to surfaces, yet expand and contract under stress without cracking.

In short, "lead" paints provide a *strong* film that gets *stronger* with initial weathering . . . stays intact *longer* than other types.

For the formulation of these three test specimens, for test procedure, or for any information relative to the importance and use of white-lead pigment in house paints, write: *Lead Industries Association, 420 Lexington Avenue, New York 17, N. Y.*

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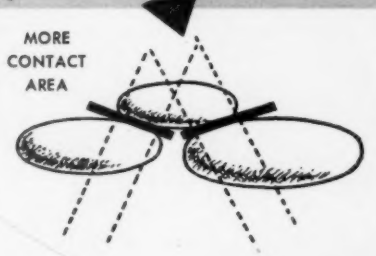

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- ★ **No color contamination**—pure white ceramic.

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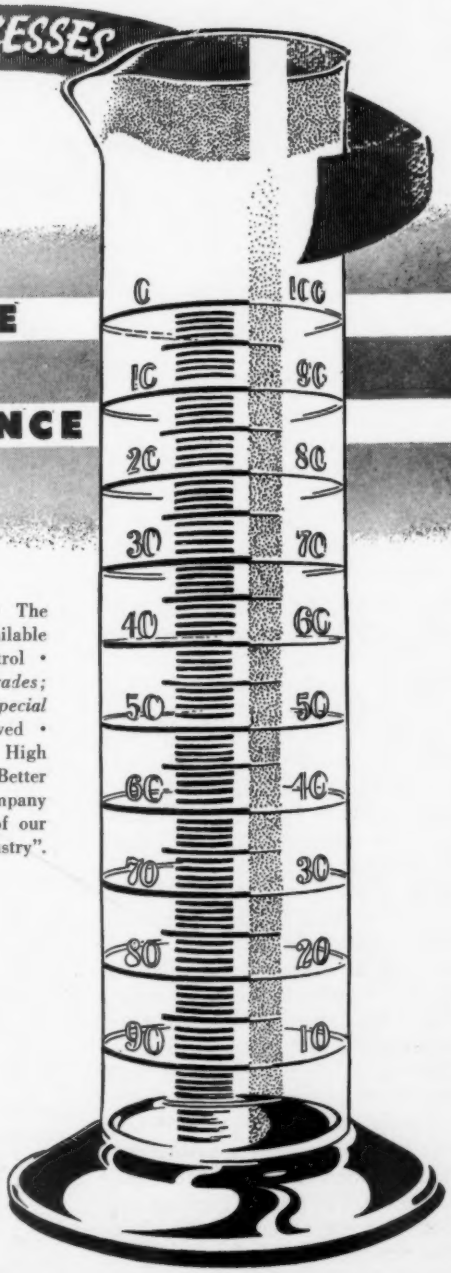

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Phenolic Resins and Their Varnishes

BY

BARGE GOLDING
Lily Varnish Co.

ALTHOUGH completely oil-soluble phenolic resins have been made since about 1930 and it has long been known that the addition of even a small quantity of a phenolic resin to a natural resin greatly improves the physical characteristics of the varnishes made from them, relatively little has been published on methods of manufacture and physical properties of the resins and properties of the varnishes made from them. What has been published is found mainly in the patent literature and in suggested formulations in resin manufacturers' data sheets.

In 1941 Turkington and Allen published the first comprehensive review (*Ind. Eng. Chem. 33, 966 (1941)*) of the properties and general preparation of oil-soluble phenolic resins, including a rather general evaluation of the varnishes made from them. The present experimental work was an attempt to evaluate what was believed to be among the best of the phenolic resins in order to ascertain differences, if any.

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Influence of Catalysts

AFTER considerable experimentation, the following general conclusions concerning resin preparation were drawn.

In either acid- or basic-catalyzed reactions, the quantity of catalyst—i.e., the pH—had no appreciable effect on the type of product formed. The only difference observed was in the rate and extent of reaction (in a given period of time), especially in the case of the basic-catalyzed resins.

The smaller the amount of catalyst used, the more easily it was removed from the reaction mass after initial condensation; hence, as small a quantity as was consistent with a reasonable rate of reaction was desirable.

As there was no danger of too complete a condensation with the acid-catalyzed resins, they were made at reflux temperature, using only a small amount of catalyst. On the other hand, many of the basic-condensed resins tended to react too rapidly and completely at reflux, necessitating careful control of catalyst amount and length of reaction. It was found that the most satisfactory procedure for the alkaline-catalyzed resins was to allow the reaction to take place at temperatures between 25° and 50° C. for 48 to 72 hours.

Approximately 1% of an acid catalyst, based on the phenol, was found to be satisfactory. For the basic-catalyzed resins, approximately 0.25 to 1 mole was optimum, usually just enough to accomplish complete solution of the phenol in the aqueous medium.

Many catalysts, both acid and basic, have been used for the initial condensation between phenols and formaldehyde. Perhaps the most satisfactory were found to be sodium hydroxide for basic-catalyzed resins. and oxalic, hydrochloric, and sulfuric acids for the acid-catalyzed resins. Acetic acid for neutralizing the basic-condensed products is very suitable, since it forms a buffer solution with the sodium acetate formed to give the optimum pH for polymerization.

Influence of pH

THE pH at which final condensation and polymerization took

place was found to exert a profound influence upon the rapidity of resinification and final color of the resin. If too much acid was present during final dehydration and condensation, the reaction proceeded quite rapidly, causing the mass to gain rapidly in viscosity. This in turn interfered with complete dehydration. On the other hand, too high a pH caused an appreciable slowing up of the reaction rate, necessitating a long period of dehydration and condensation which caused darkening of the resin. The following limits have been established as a guide:

pH > 7	Yellow product
pH = 6–7	Pale product; long condensation time
pH = 5–6	Pale product; optimum condensation time
pH < 5	Too rapid condensation; often a dark product.

It is of interest to note that the quantity of catalyst used was independent of the phenol-formaldehyde ratio. Although many phenol-formaldehyde ratios can be used to give resins varying properties, in order to give products that were fairly representative of workable ranges, the present research used the following:

Acid-Condensed

Phenol: HCHO 1.0 : 0.8

Basic-Condensed

Phenol: HCHO 1.0 : 1.0 and 1.0 : 2.0

The reason for the low ratio for the acid-condensed resins is that certain phenols tend to form oil-insoluble resins if the ratio is 1.0:1.0 or greater. By keeping below this ratio, oil solubility for all resins was assured, yet all resins would have the same phenol-formaldehyde ratio.

Results showed that with the basic-catalyzed resins, the higher the formaldehyde content, the less viscous was the initial condensation product and the paler was the final resin. However, changes of formaldehyde content in the resins produced much more significant differences in the varnishes.

Rate of Reaction

THE rate of reaction of formaldehyde with various phenols was observed to vary widely. It was noted that the phenols fell roughly into the following classes:

Rapid Reaction Rate

Phenol
Cresol
Bis-Phenol-A

Medium Reaction Rate

p-tert-Butyphenol
p-tert-Amylphenol

Slow Reaction Rate

p-Phenylphenol
p-Cyclohexylphenol

Thus it appeared that the rate of reactivity of phenols might be predicted approximately by the length and type of substituent group attached—i.e., a short, aliphatic chain or none indicates rapid condensation; a cyclic or alicyclic group indicates slow condensation; and in between the two types lie the longer aliphatic chains, the rate of activity decreasing as the chain grows longer.

The presence of air during initial condensation appeared to have little or no effect upon the color of the resin. However, during the final condensation and polymerization, the absence of air helped noticeably to retain the initial pale color of the resin.

Although acid-condensed resins generally produced resins somewhat lighter in color than did the alkaline-condensed ones, it was the latter class that exhibited the greater color stability. Many of the acid-condensed resins could be "heat bleached" by the use of oxalic acid at high temperatures (Rust, U. S. Patent 2,141,198), which lightened their color somewhat. The basic-condensed resins could not be treated thus because of the high temperatures required. It is felt, however, that neither the use of an inert atmosphere nor the use of a bleaching agent is very worthwhile industrially, since even if the resin is prevented from oxidizing during manufacture, it will darken during the varnish cook or later.

As mentioned in the preceding paragraph, the final temperature of dehydration and polymerization was different for the acid- and the basic-catalyzed resins. All of the acid-condensed resins were thermoplastic, hence could be heated to a much higher temperature (about 200° C.) than the basic-condensed resins which tended to be thermosetting. The basic-condensed resins varied in the top temperature to which they could be heated depending, to a great extent, upon the phenol-formaldehyde ratio. The more the formaldehyde content, the more thermosetting the resins became. Final temperatures of 110° to 150° C. were satisfactory for the basic-condensed resins.

Partly due to the temperatures to which they were heated, and partly due to the inherent properties of the resins themselves, it was found that the 1:1 basic-condensed resins melted and the lowest and the acid-condensed resins the highest. The whole melting point range was not great, however, being between 50° and 90° C. as measured by the capillary tube method.

It is of interest to note that the resins from a particular phenol varied from light to dark in the following order: 2:1 basic-condensed, 1:1 basic-condensed, and acid condensed.

Phenolic Varnishes

THE following phenols were the principal ones investigated for use as starting materials for resins: p-cresol, p-tert-butyl phenol, p-tert-amylphenol, p-cyclohexylphenol, p-phenylphenol, and Bis Phenol A (2,2-bis (p-hydroxyphenyl) propane).

Varnishes made from these resins were made in 10, 30, and 50 gallon oil lengths. The 30 gallon length was studied most extensively as it was felt to be most representative of the average of all oil lengths. Tung oil was used as the principal oil, with 20% heat-bodied linseed oil used as a chill-back. Drier proportions were 0.5% cobalt naphthenate and 0.5% lead naphthenate, based upon the oil content.

Almost all of the resins were easily soluble in wood oil. All of the acid-condensed resins dissolved without difficulty. Only the basic-condensed cresol resins showed borderline compatibility, as might be expected. It was observed that, in general, the basic-condensed resins containing the greater proportion of formaldehyde were the least soluble of the resins.

Likewise, almost all of the varnishes showed good compatibility with mineral spirits, especially those of 30 and 50 gallon oil lengths. Only the cresol and phenyl-phenol varnishes needed some aromatic thinner in the short and medium oil lengths.

Insofar as possible, all varnishes were cooked under the same conditions. Naturally the short oil varnishes could not be cooked as long

(*Turn to page 44*)

VINYLS

For Surface Coatings

Part V

By

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VINYLIDENE chloride-acrylonitrile copolymers are claimed to possess high resistance to solvents, oils, greases, acids and alkalies, and unusually high moisture vapor transmission resistance. Also, they are free from odor, taste and toxicity. Polymers of vinylidene chloride and acrylonitrile or vinyl cyanide are produced in a range of viscosities, from 40 to 8000 centipoises. (20% MEK sol'n.) Saran F-120 resin (Dow Chemical Co.) is a typical resin of this type.

Methyl ethyl ketone is the most effective solvent for these resins, it may be replaced largely or wholly by various other ketones, or up to 30% by toluol. Films must be thoroughly dried as solvent retention decreases moisture vapor transmission resistance.

When plasticizers are used (e. g. in textile coatings), relatively small amounts are very effective. These resins are stated to be resistant to plasticizer spewing. Sebacates and phthalates are more effective than phosphate plasticizers. 10 to 15 percent plasticizer is recommended for applications requiring low-temperature flexibility, as in paper coatings. These resins are compatible with pure phenolics, rosin esters, polystyrene, and some acrylics. While these modifiers generally lower chemical and moisture vapor transmission resistance, they improve gloss, clarity, and solvent release in some cases.

Many types of pigments may be used. The chief exceptions are zinc compounds and reactive iron pigments. Grinding on a pebble mill is feasible, but best results are obtained on a rubber mill.

Suggested uses include coatings for cellophane, paper, etc. and cobweb spraying for packaging of machinery.

A latex of a resin of the above type is available as Saran F-122 latex. It contains 56% solids, at 0.1 micron particle size, and pH of 6.5 to 7.5. In order to form clear, continuous, impervious film without need of heat treatment, the latex must be plasticized (minimum of 15% plasticizer) to give maximum tensile strength. Sebacic, phthalic, glycolic and phosphoric esters are useful. They should be emulsified and homogenized before adding. Films are resistant to acids, but not very resistant to alkalies. They are dissolved only by ketones and esters; moisture vapor transmission resistance is moderate. The latex may be modified with thickeners such as hydroxyethylcellulose or wetting agents. It can be colored by use of toners, pigments, or water-soluble dyes added to the water-phase, or by oil-soluble dyes added to the plasticizer. Recommended uses include paper coatings showing grease-proofness and heat-sealability, textile coatings and floor finishes showing resistance to water and abrasion. Coatings are claimed to adhere well to most primers and oil paints, but strippable coatings can be formulated by use of small amounts of glycerine or stearic acid.

This is the last in the series of articles on Vinyls for Surface Coatings. Part V discusses such factors as vinylidene chloride polymers, polyvinyl chloride, polyblends, latices, chloride-acetate copolymers, vinyl type finishes and coatings, and organosols and plastisols. Parts I, II, III, and IV appeared in the February, May, July and September issues respectively.

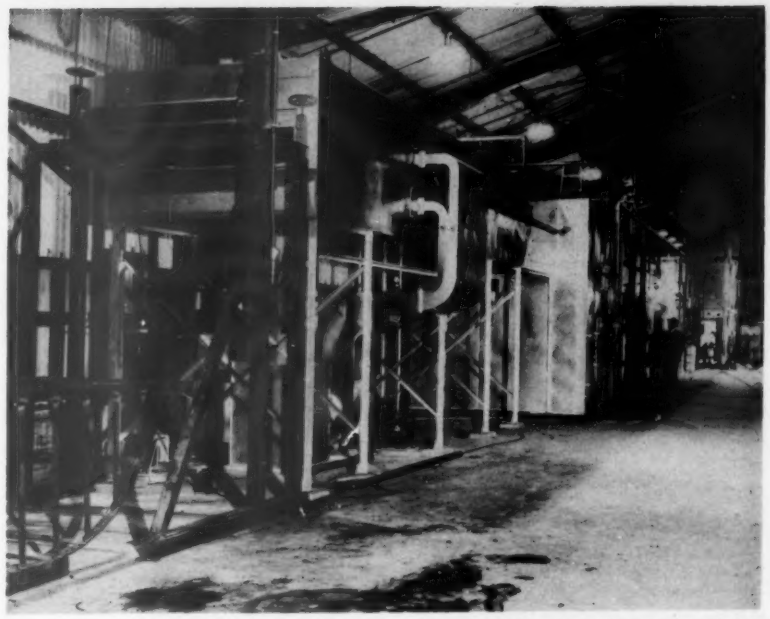
Polyvinyl Chlorides

THESE resins are claimed to possess thermal and light stability in addition to the chemical resistance and toughness expected in this type of material. Geon 101 is designed for application from solutions of low solids content; 4½% solids is recommended for application at 20° C, 12% solids for application at 70° C; methyl ethyl ketone being the solvent. Resin 121 is used for plastisol and organosol formulations for heavy coatings. The dispersions may be applied by spread or knife coating, or by dipping. In the latter application, even heavier than usual coating thicknesses can be obtained by preheating the article to be dip-coated which sets up a layer of the paste next to the hot surface. Vinyl chloride-vinylidene chloride copolymers show greater thermoplasticity and solubility than straight polyvinyl chloride, while retaining excellent stability to light, heat, water and alkali, and good chemical resistance. They are produced in a range of intrinsic viscosities, the lowest of which allows application at 17½% solids in methyl ethyl ketone at 20° C. Use of cyclohexanone in combination with MEK allows slightly higher solids content. Solutions are applied by dipping or spreading. Geon 200 series are typical examples of this resin.

A late development in this line of copolymers is a resin which shows increased solubility because of higher vinylidene chloride content. It is directly soluble in toluene, xylene and high aromatic naphthas, as well as in the usual vinyl solvents. Compared to other vinyl coating resins, this resin shows relatively low intrinsic viscosity, yielding solutions of over 20% solids at 50 centipoises (Brookfield) viscosity, and between 30 and 40% at 1000 centipoises. Ketones give decidedly lower viscosity solutions than aromatic hydrocarbons, and in each class, lower molecular solvents result in lower viscosity. Thus, at a given viscosity, MEK gives about 10% higher solids content than toluol. Acetone results in still higher solids content (or lower viscosity) than MEK, while MIBK (hexone) gives lower solids content than MEK, and xylol gives lower solids than toluol. Mixtures of any of these solvents change gradually in solvency as the composition is varied. Even very high solids content solutions (up to 50%) are free from gelation tendency, though of very high viscosity. The resin is claimed to possess good chemical and

abrasion resistance, toughness and flexibility. It is sensitive to the tackifying action of plasticizers. Where high flexibility is required, no more than 5–10% of solvent-type plasticizer should be used. For most uses, the inherent flexibility of the resin alone should suffice. This plasticizer sensitivity makes Geon 200X20 unsuitable as a top coat for plasticized vinyls because of plasticizer migration. The resin is compatible with many rosin-derived materials (e. g. rosin esters, rosin alkyds, modified maleic resins), and with Hycar synthetic rubber (butadiene-acrylo-nitrile copolymer). It is also compatible with certain castor-oil alkyds and has limited compatibility with amino-formaldehyde resins. Because of the relatively low softening point Geon 200X20, unloaded coatings which are likely to be in contact with other surfaces must be compounded with other resins to raise the softening point, to prevent blocking. Several rosin derivatives result in non-blocking, though very short films. Pigmentation is best performed on a differential speed 2-roll mill; pebble milling is also satisfactory. "Polyblend" (Geon 500 series) is a colloidal blend of polyvinyl chloride and Hycar rubber (butadiene-acrylonitrile copolymer) which produces elastomeric coatings with little or no liquid plasticizer added. These coatings are tough, flexible, solvent and chemical resistant, and are characterized by non-migration of plasticizer. Suggested uses are low-voltage or jacket insulation, cloth and paper coatings. The resin may be calendared on, or applied from solutions which can be prepared at room temperature.

At some time during the operation preferably during milling the blend must be heated to 300–325 degrees F. in order to convert it into a homogeneous plastic material.



Photos courtesy of the Monsanto Chemical Co.

Coating machine looking from delivery end in foreground to entering end in background.

Latices

GEON type latices are stated to be stable emulsions of 0.2 micron particle size. Unplasticized latices should be compounded with emulsified plasticizer, and can be pigmented. They must be fluxed at 300° F for film formation.

Polyblend latex is a polyvinyl chloride-Hycar rubber blend. As discussed in the preceding paragraph, it must be fluxed after application.

Dow Latex 744 is the only resin presently commercially available in Dow's line of vinyl chloride-vinylidene chloride copolymer coating resins. This mildly alkaline dispersion of 50% solids content is film-forming only when plasticized. The usual ester plasticizers may be used, pre-emulsified or (in the case of very fluid plasticizers) added directly to the latex. Pigments used with this latex should not liberate polyvalent metal ions (e. g. calcium, zinc), as these cause coagulation. Various thickeners may be used to modify the viscosity. In most cases, they result in considerable thixotropy. Among water-soluble and water-dispersible materials, interesting film properties are obtained by addition of hide glue, Dow Latex 512K (butadiene-styrene copolymer and Neoprene latex and some urea formaldehyde resins to Latex 744. An interesting feature of Latex 744 is its compatibility with drying oils, medium oil length varnishes, and alkyds, especially longer oil types. Compatibility is improved by oxidizing of oils, and is good at high and low latex percentages. Small amounts of drying oil (oil-in-water emulsion) improve adhesion to most surfaces, after air-drying. Large amounts of varnish into which the latex is incorporated as a water-in-oil emulsion, show improved abrasion and chemical resistance compared to straight varnish. Gloss is usually decreased by latex addition. Primers of this type show improved adhesion to top coats. Recommended starting formulae call for 1 part of latex 744 to 3 of varnish or 4 of primer (by volume).

Plasticized films of Latex 744 are resistant to oils and aliphatics, but not to aromatic hydrocarbons, etc. Resistance to acids, alkalies and salt solutions varies from no change to severe discoloration depending on reagent and plasticizer employed. Resistance to ultraviolet radiation and moderate heat, is stated to be generally very good depending mainly on the resistance of the plasticizer to ultraviolet breakdown and evaporation, respectively. Low-temperature flexibility with various plasticizers follows the lines previously discussed for vinyls. Moisture vapor transmission resistance is best when polymeric alkyd plasticizers are used.

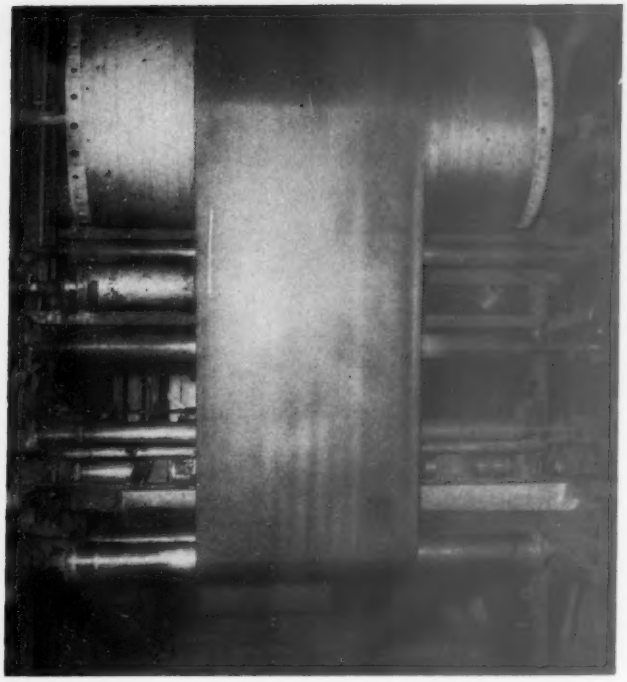
Goodyear has lately introduced a line of vinyl chloride copolymers, claimed to possess very good internal plasticization and good heat and light stability. These are used mainly in calendaring and organosol application since their solubility in organic solvents is limited.

Chloride-Acetate Copolymers

THESE resins are considered in greater detail than the ones previously described, both because of their unusual characteristics regarding resistance and versatility of application, and because of the large amount of published information available about these materials.

The resins of this group are co-polymers of vinyl chloride and a smaller amount of vinyl acetate, the various grades varying in the proportions of both components, as well as in molecular weight. Their general characteristics are in many points similar to those of the copolymers discussed above.

These resins are thermoplastic, neutral, non-oxidizing, essentially non-heat-reactive, designed to form film by evaporation alone from solution in a volatile solvent. Absence of odor, taste and toxicity, make these resins suitable for lining food and beverage containers. They have extreme chemical resistance and solvent resistance, not attacked by any strength alkali or mineral acid at normal temperatures (including hydrofluoric acid and aqua regia) completely insoluble in alcohols, greases, oils and aliphatic hydrocarbons. They can be used to coat concrete and alkaline wall-



Entering end of a coating machine at Graniteville.

boards and in the formulation of electroplating stop-off lacquers. These resins have high water and weathering resistance, low water absorption and moisture vapor transmission. Toughness, flexibility and strong adhesion can be attained by proper formulation.

Properties

AS molecular weight increases, solubility of the resins decreases and solution viscosity increases, whereas film strength and softening temperature increases, as expected.

This section will consider grades differing mainly in molecular weight. Special grades designed for specific compatibilities etc., will be discussed subsequently.

A resin of medium molecular weight (VYHH) is the grade most widely used as it embodies good solubility and toughness. It contains 13% vinyl acetate, the rest vinyl chloride about 1:9 of acetate to chloride on a molar basis.

A much lower molecular weight resin (VYLF), the intrinsic viscosity of which is less than half that of VYHH, is consequently soluble in a much higher concentration, as well as in a wider variety of solvents. As expected, this resin has less strength and inherent flexibility, becomes tacky at lower plasticizer content than a corresponding VYHH formulation, and shows a lower softening temperature. It is used mainly to modify VYHH coatings and to build up their solids content without excessive sacrificing of desirable properties.

A series of high-viscosity resins is used mainly for cloth coatings. Their intrinsic viscosities vary from about 1½ times (for VYNS-3) to about 2½ times that of VYHH (for VYCM and VYDR). The proportion of vinyl chloride to vinyl acetate is 95:5 for VYDR, about 90 to 10 for the other two. The main advantage of these resins is their toughness and flexibility when plasticized. They tolerate large amounts of plasticizer without tackiness, and show block resistance at elevated temperatures. This is especially the case with VYCM and VYDR, the former is of slightly higher molecular weight, but lower chlorine content than the latter giving VYCM a higher solubility. These resins need stronger solvents than VYHH, usually 100% of active solvents are used.

Resins of very high molecular weight and chlorine content are designed for use in dispersions.

Vinylite copolymer resins show good compatibility with solvent-type chemical plasticizers. Extremely limited compatibility exists with drying and non-drying oils, alkyds, phenolics and natural gums.

VYHH usually requires about half the plasticizer proportion which would be used in a ½ sec. RS nitrocellulose formulation. VYLF requires a larger amount of plasticizer to compensate for its lower inherent flexibility. The main requirements of an acceptable plasticizer usually are minimum evaporation rate from film, heat and weathering stability. Non-solvent plasticizers are not recommended for use with Vinylite, mainly because of a spewing and sweating tendency.

In most cases, the benefits of blending Vinylite with the few compatible modifiers are stated to be limited. For outdoor coatings, blending of Vinylite with methyl methacrylate polymer decreases chalking providing the pigment is dispersed in the acrylic. Film strength, sprayability and cost are improved compared to straight methacrylate coating. Certain stearates improve water and marring resistance slightly.

Solutions

THESE resins dissolve readily at room temperature in ketones, esters, nitro compounds, certain chlorinated hydrocarbons. They are swelled by aromatic hydrocarbons (dissolved at elevated temperatures). Water, alcohols and aliphatic hydrocarbons are strong precipitants.

Ketones, as a class are the best solvents, yielding higher solids content without gelling, lower viscosity at any given solids content, and greater non-solvent dilution ratio than other types of organic solvents. They are stable and non-corrosive on storage, and present no additional industrial hazards compared with customary ester-type solvents. Esters yield lower maximum solids content, and higher viscosity at given solids content than ketones. Nitroparaffins are stated to yield higher viscosity solutions, but in some cases permit higher solids content without gelation, than ketones. However, chlorinated solvent mixtures, such as "Chlorasol" (a mixture of ethylene dichloride and carbon tetrachloride) or mixtures of trichloroethylene and ethylene dichloride, yield nonflammable VYHH solutions, but these solvents are much more toxic than ketones and esters. They are to be used only with extremely effective ventilation.

For spraying applications, aside from price considerations, thinners should be balanced between drying ease and freedom from moisture blush, baking blisters and flowout difficulties. A relatively strong (or solvent-rich) thinner may be used for the concentrated lacquer, to be thinned to spraying viscosity with a very lean thinner. Roller-coated metal finishes usually require larger portions of high-boilers, e. g. isophorone with high-boiling petroleum or coal-tar naphthas as diluent. For paper and cloth coatings, relatively volatile solvents may be used. Moisture blush tendency is less than in the above applications due to lower heat transfer and controlled drying conditions. Besides methyl ethyl ketone and methyl isobutyl ketone (hexone), acetone may also be used. Such seemingly unbalanced combinations of solvent and diluent as acetone and toluene are feasible because the rapid loss of active solvent (acetone) is counterbalanced by an increase in solvent power of toluol with increased temperature. Brushing thinners require relatively slow-evaporating solvents for ease of application and flowout. In this type of application, balance

of diluent against solvent is necessary to minimize redissolving ("pickup") on recoating, which would occur with an excessively rich solvent formulation.

Clear Coatings

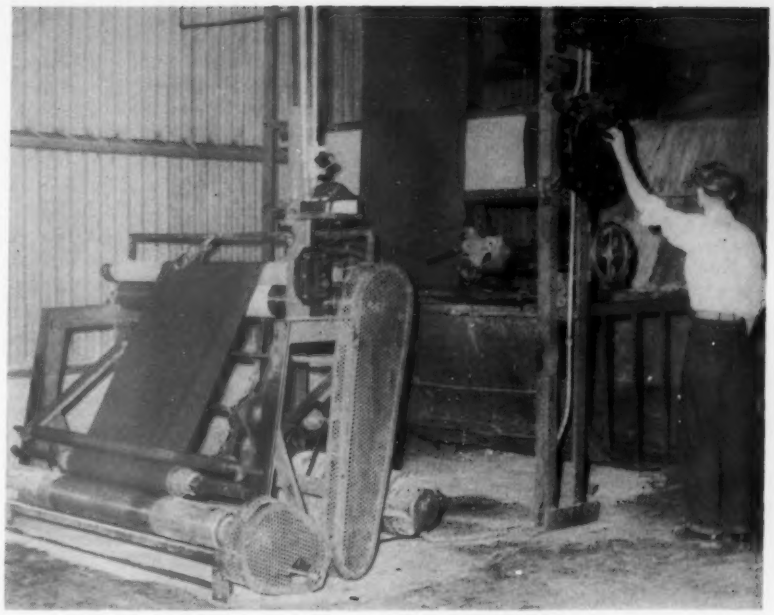
IN the formulation of clear coatings, plasticizers, dyes, heat and light stabilizers may be included. For maximum chemical resistance, the copolymer resin should be used without any modifiers, as these, especially plasticizer, decrease the resistance of the resin.

For preparation of clear resin solutions, a high-speed mixer is usually most effective. With VYHH and VYLF, the resin is often slurried into the diluent, resulting in rapid solution when the active solvent is added. In the case of high-viscosity resins, however, lower viscosities are stated to be obtainable by first wetting with more active solvent (cyclohexanone or isophorone), then adding the other solvent (MEK or hexone); in these formulations, 100% active solvents without diluents usually give best results; warm application, and extremely vigorous agitation just before application, are recommended to increase solids content which may be applied.

On most surfaces, optimum adhesion is secured by baking at a temperature high enough to drive off residual solvents and actually fuse the resin to the base surface. Baking is essential, especially on smooth, impervious surfaces such as metals, glass, and composition boards. On open, porous surfaces such as concrete, unfinished paper, cloth, etc. air drying frequently gives satisfactory adhesion. In some cases, special primers over impervious surfaces will give adhesion without baking. The degree of pigmentation is often important in these cases. A highly pigmented intermediate coat based on Vinylite may give good air-dry adhesion between a Vinylite top coat and a primer of another type; but in almost every case, baking gives superior results.

Films should be heated to 350 to 375° F for a few minutes; the actual baking time depends on the time necessary to bring the coated object to the desired temperature. A second coat of Vinylite needs only enough heat to drive off the solvents, as adhesion between coats is excellent without baking. Inclusion of VYLF resin produces heat flow, which may be used to eliminate sanding scratches.

Normal drying takes place in forced-draft convection ovens. Radiant heating units may be used for dark coatings. Heat application should be gradual if volatile solvents are used to prevent blistering. In selecting air exhaust velocities, the possible formation of explosive mixtures of air and solvent vapor should be guarded against.



Delivery end of coating machine at Graniteville Co.

Pigmented Finishes

IF properly pigmented, finishes based in these copolymers fail by slow chalking rather than by checking; film integrity is maintained almost indefinitely.

The pigment is usually dispersed in the resin itself, generally as a concentrated pigment paste which is then mixed with clear resin solution. Dispersions are commercially available in paste and chip form. Best results are obtained by use of 2-roll differential-speed mills, as the heat developed by shearing of the resin softens it into a plastic mass, thus aiding the dispersion process. Internal mixers (Banbury type) give good results in some cases. Ball mills give reasonably good results, especially with lead pigments, but the gloss obtained may be inferior. Best results on ball and pebble mills are obtained by first milling the pigment in thinner which may contain wetting agents, then adding dry resin or highly concentrated resin solution and continuing milling. Most formulae given for roll mill stocks contain about 15% VYHH, 6% chemical plasticizer, and 1% blown castor oil (for slight heat stabilizing action and to prevent sticking to the rolls). Temperature control during milling is important, both for dispersion and to prevent discoloration of resin.

Almost all common pigments can be used, except iron and zinc pigments, which affect the heat stability of Vinylite. Certain synthetic iron oxides, and certain of the less basic zinc oxide pigments may be used if the finish is to be air-dried or baked below 300° F. Zinc oxide should be blended with titanium dioxide and antimony oxide before milling. In this application it improves the chalk resistance. Lead pigments show definite heat stabilizing action, but are often limited by their toxicity, lack of fume-proofness, and moderate hiding power. Some organic toners and gas-carbon blacks give good results. Carbon may be treated with ammonia before milling to improve dispersion.

VYLF and the high-viscosity Vinylite resins may be used for making 2-roll mill stocks. The former requires more careful adjustment of plasticizer and often gives inferior results. The latter, while requiring higher milling temperatures and higher plasticizer content than VYHH, may give fully satisfactory stocks.

Finishes to be stored for long periods must be heavy in body to prevent pigment settling and agglomeration. The thinner should be solvent-rich to provide optimum stability. Thinning for application purposes can be done with lean thinners. This should be stirred in slowly to prevent "flooding" of the pigment.

For exterior coatings, excellent weathering resistance is claimed, as well as resistance against flying grit, corrosive fumes, and sulfuric acid droplets and spillage with these resins.

Chalk resistance of exterior formulations is improved by the use of some of the newer grades of titanium dioxide; also by inclusion of a fairly large portion of antimony oxide, or of ZnO (the latter subject to the limitation on baking discussed in the previous section). Lead titanate, a slightly yellowish pigment, has excellent chalk resistance.

Clear Emulsions

THE techniques, as well as considerations of advantages and disadvantages, regarding vinyl emulsions are largely the same as for lacquer-phase emulsions in general. Thinners used in preparing the lacquer phase should be substantially water-insoluble, and must contain a large amount of high-boiling material to prevent moisture blush and to form a continuous film on drying. Aside from the question of possible saving in solvent cost due to higher solids content as applied (depending on the portion of expensive high-boilers necessary) the use of emulsions offers the advantages of possible decrease in the number of coats necessary, lessened penetration into porous surfaces, better brushing characteristics, absence of "pickup" of previous coats, applicability to wet surfaces, and decreased fire hazard. Possible disadvantages include dimensional distortion of some base materials (e. g. paper and cloth), corrosion of ordinary iron and tin-plate containers by the water-phase, difficulties in pigmentation, possible instability of the emulsion in storage, and lessened water and corrosion resistance due to the presence of emulsifing agents in the film. The last drawback may be minimized by the use of ammonium soaps, (e. g. oleate, formed in situ) which regenerate fatty acid with liberation of ammonia upon heating. Maximum solvent economy is achieved, in gel emulsions, in which the resin is dissolved and emulsified hot in a solvent unable to effect solution at room temperature. Emulsions should be prepared by conventional methods, then homogenized. In the case of gel emulsions, jacketed equipment is necessary.

Special Resins

RESINS discussed in this section owe their important properties to composition rather than differences in molecular weight.

The composition and molecular weight of VMCH grade is virtually identical with that of VYHH (standard medium-viscosity grade) except for the presence of 1% of maleic acid hetero-polymerized with the vinyl chloride and vinyl acetate; its viscosity and solubility characteristics are therefore substantially the same as those of VYHH. Other properties compare as follows: heat stability in unstabilized films is about equal for both resins, light stability is equal for properly established films, but VMCH is slightly inferior when unstabilized. On air-drying or low-temperature baking, VMCH shows superior adhesion, compared to VYHH on smooth surfaces where no mechanical anchorage is possible, such as clean steel and other metals. Adhesion on wood is only slightly improved by use of VMCH. On phenolic, alkyd and oil-base coatings, some adhesion is obtained only on baking.

VMCH in combination with reactive pigments shows the same thermal breakdown at high temperatures as discussed in the case of VYHH. In addition, due to its acidic nature, VMCH reacts with basic pigments even at room temperature, causing gelation unless anti-gelling agents are added to delay this reaction. These pigments include zinc chromate, zinc oxide, zinc dust, strontium chromate, red lead, lead chromate, blue basic lead sulfate, some natural iron pigments etc. Some brands of these are more reactive than others. Neutral or slightly acidic pigments, TiO_2, tri-lead orthophosphate, and tetra-lead orthophosphate, are well suited for use with VMCH. In order to use the basic (reactive) pigments listed above, resort must be either to a two-container formula (pigment ground in plasticizer, with VYHH if this is to be used with formula, in one container, and VMCH solution in the other, the two to be mixed just before application). Anti-gelling agents must be used. These include n-butyl acid phosphate, ammonia (preferably added as gas), maleic acid, and diphenylguanidine. These usually delay gelation only for a few hours, and all except the first one listed will interfere with air-dry adhesion. Some reactive pigments have been found to produce an irreversible gel almost instantaneously when VMCH solution is added to a grind of the pigment in VYHH. Obviously the mixing-lacquer or two-container technique is unworkable in these cases. To prevent loss of air-dry adhesion of VMCH solutions in contact with reactive metals during manufacture or storage, addition of 0.5% propylene oxide (on resin weight) is recommended.

Mention has been made of the addition of VMCH to acrylic resins to improve sprayability and adhesion to smooth surfaces while retaining the clarity, aging resistance and other desirable characteristics of acrylics. VMCH has been found to have a somewhat higher wax tolerance than VYHH, thus permitting low moisture vapor transmissoin coatings without resorting to partially incompatible solutions which are troublesome to handle.

VAGH is a resin of high vinyl chloride content (91%), of an intrinsic viscosity slightly higher than that of VYHH, and with part of the acetate groups hydrolyzed off (producing an OH content of 2.3%, or 6% when calculated as vinyl alcohol content). Its salient feature is its compatibility with, and adhesion to, a much wider range of coating materials than those usable with the unmodified vinyl copolymers. Consequently, it widens the scope of copolymer applications (over various types of primers etc.), and permits wide modification of vinyl finishes, as well as improving the properties of other types of coatings (oleoresinous and alkyds) by the addition of small amounts of VAGH.

The same general types of solvents can be used with VAGH as with VYHH; solution viscosity is generally slightly higher in the case of VAGH. Due to its OH content, this resin tolerates substantial amounts of alcohols. Solvent release, with comparable thinners, is similar to that of VYHH, but can be speeded up by inclusion of alcohols. VAGH is less tolerant of hydrocarbons, especially aliphatics than VYHH.

The softening point of a VAGH formulation is appreciably higher than that of the corresponding VYHH formulation (about 40° F. difference between unplasticized resins, 20° F. between resins containing 25% DOP plasticizer). By the same token, higher temperatures must be used when VAGH is being compounded (e. g. pigmented) on a two-roll mill or Banbury mixer. For equivalent flexibility, VAGH requires slightly more plasticizer than VYHH (e. g. 27 to 30 parts against 25 for VYHH); in addition to the ester plasticizers commonly used with vinyls, many other plasticizers may be used because of the wider compatibility of VAGH, making possible the selection of more permanent and less expensive plasticizers (oils, alkyds, etc.)

Besides the resins previously mentioned as compatible with VYHH, resin VAGH is also compatible with various types of alkyds (drying and non-drying, long and short oils), polyvinyl acetates including hydroxyl-modified types, raw and blown castor oils, and resins VYHH and VMCH in some cases. Compatibility with urea and melamine resins, and with oils and varnishes, is variable but much better than that of VYHH. Generally, the only classes with which VAGH is incompatible are cellulosics, baking phenolics, natural gums, polyvinyl butyral, chlorinated rubber, and allyl starch.

VAGH shows water resistance nearly as good as that of VYHH, and even lower moisture vapor transmission; the latter may be further lowered by the addition of waxes and blending agents, with which VAGH shows improved compatibility. While resistance to alcohols, acids and alkalies is good, no information is given concerning comparison of VAGH with VYHH on exposure to these materials. Heat and light stability are equivalent to those of VYHH.

For best results in pigmentation of VAGH mixes, the differential two-roll mill is recommended; internal mixers, ball mills, and roller mills may be used.

While the air-dry adhesion of VAGH to clean metal is inferior to that of VMCH (though better than that of VYHH), its adhesion to other types of coatings such as alkyds, oleoresinous,

phenolic varnishes, shellac and polyvinyl butyral is much better than that of either VYHH or VMCH. This opens up such applications as industrial and marine finishes over the polyvinyl butyral-base wash primers, previously discussed; tough, chemically resistant wood finishes taking advantage of the good adhesion to shellac and other wood sealers (though not to coatings based chiefly on nitrocellulose); label overprint varnishes, because of the adhesion to oil-base inks; restoration of maintenance systems which have failed in spots, by cleaning the rusted spots and giving them a coating of butyral wash primer, and then within a half-hour, applying a VAGH-base finish coat to the entire area; on well-aged oil paint, no lifting should occur, and on fresh oil paint it can be minimized by proper choice of thinner (e. g. inclusion of alcohols) as outlined above.

Insolubilization of VAGH-base coatings is facilitated by the reactivity of its hydroxyl groups, and its improved compatibility with thermosetting resins. The latter provide the simplest method; thus, even 5 to 10% of urea, melamine, or phenolic resin produces noticeable insolubilization. Blending is facilitated by the use of a small amount of Cellosolve in cases where commercial resin solutions contain water or large amounts of alcohols. Various amines, polyamines, and rubber accelerators, which have some insolubilizing action on regular copolymers, show increased effect with VAGH; bakes of about an hour at 300 to 325° F. are usually required. Considerable color may be developed, especially when zinc or other metal compounds are used as promoters. Good insolubilization of air-dried films is obtained by the chemical action of small amounts of hexamethylene diisocyanate (difficult in practice due to great reactivity. Precautions regarding toxicity are necessary). Glyoxal, under alkaline conditions promotes insolubilization at a slower rate. The use of 5 to 30% compatible diglycidyl ether (to cause cross-linking by reaction with the hydroxyl groups), together with about the same amount of urea-formaldehyde resin, produces unusually hard, mar-resistant and steam-resistant coatings after a short bake.

While the above discussion has covered applications using VAGH as the major vehicle, an equally interesting field is that of using it to modify other coatings. Thus, as little as 10 to 20% VAGH with VYHH produces a coating of adequate air-dry adhesion to butyral-base wash primers, while a mixture of VAGH and VMCH produces a versatile air-dry or low-bake primer showing good adhesion to clean metal and to various types of coatings. In the fortification of alkyds and varnishes, inclusion of a small amount of VAGH is stated to shorten drying time, increase film hardness, toughness, flexibility, cold-check resistance, and resistance to water (including submerged conditions), acid, and alkali. Data given for various types of alkyds indicate that addition of 10 to 20% VAGH (on vehicle solids basis) reduces the tack-free and print-free drying time to less than half, and imparts appreciable resistance to immersion in 3% sodium hydroxide.

VYCC is designed for compatibility with nitrocellulose, is of relatively low intrinsic viscosity (slightly above VYLF) and high vinyl acetate content (38%). Films of VYCC per se show similar resistance as those of VYHH, but are more brittle and of lower softening point. Besides nitrocellulose (at least 2 parts of NC to 1 part VYCC), this resin is compatible with the other acetate-chloride copolymers, especially VMCH) and some acrylics; it is incompatible with cellulose esters and ethers (other than nitrocellulose), alkyds, polyvinyl acetate and butyrate. Compatibility with most common plasticizers is good, except for linseed and castor oils. The resin, which is marketed as a 40 per cent solution in butyl acetate can be infinitely diluted with vinyl solvents and strong diluents (e. g. toluol and ether-alcohols; to approximately 30% solids with ethanol, butanol or "Troluoil" mineral thinner).

Pigmented lacquers using a nitrocellulose and VYCC vehicle show outstanding outdoor exposure resistance (including gloss retention and chalk resistance), as well as improved resistance to cold-check, perspiration, moisture, alcohol and corrosive conditions, compared to other nitrocellulose formulations.

Organosols & Plastisols

VINYLITE dispersion resins VYNV-1 and VYNV-2, vinyl chloride-acetate copolymers of over 95% vinyl chloride content, are chemically identical but differ slightly in wetting and dispersion properties. The former is designed for organosols, the latter for plastisols. Consisting of small agglomerates of very fine resin particles, they must be dispersed in the liquid medium for grinding. The preferred grinding methods are ball or pebble mills, yielding the finest dispersions, (consequently best film transparency) and roller mills for dispersion of high solids content. Liquids of low volatility are required in the latter method. Three-roller mills are preferred in the grinding of plastisols (i. e. dispersions in plasticizers containing no volatile liquids; limited to compositions of high plasticizer content). Plastisols are often de-aerated under vacuum before use.

The colloidal behavior of dispersion resin formulations is quite complex and cannot be covered in detail within the scope of this paper. However, several general principles will be of interest. Optimum flow at given solids content is obtained when the resin aggregates are completely dispersed without being excessively swelled, since both insufficient dispersion (agglomeration or flocculation) and oversolvation (swelling) cause excessive viscosity, the latter by reducing the amount of free liquid left in the dispersion. Thinners for organosols consist of balanced blends of dispersants to promote the wetting of the resin and diluents to prevent excessive swelling.

Commonly used dispersants include chemical plasticizers such as DOP, and volatile ketones, one of the best being di-isobutyl ketone. The latter has little solvent action at room temperature, which prevents oversolvation, and facilitates fluxing at elevated temperatures due to increased solvency. More powerful vinyl solvents such as isophorone, can be used in order to obtain clear films at minimum baking temperatures, but they require lowering of solids content, or addition just before use, in order to maintain a workable consistency. Glycol-ethers, (cellosolve) are recommended as offering wide latitude in formulation. They cause little solvation when used in excess, and help overcome false body caused by contamination by traces of water. Wetting agents also help overcome this trouble.

Diluents used include aromatic and aliphatic hydrocarbons. As the percentage of aliphatic hydrocarbons in the diluent is increased, a larger amount of dispersant becomes necessary, and the optimum viscosity at given resin content decreases due to lessened swelling. In highly plasticized organosols, where no volatile dispersant is used, the thinner balance is controlled entirely by the proportion of aliphatic to aromatic hydrocarbons. Over the usable range of resin content, the optimum composition for any combination of dispersants and diluents is independent of resin solids content.

Solutions of resins (e. g. Vinylites VMCH, VAGH, VYHH, VYLF, and poly-n-butyl methacrylate) added to organosols are useful for control of liquid viscosity and cohesion, (hence control of behavior on the mill and penetration into porous surfaces), prevention of "mud-cracking" during air-drying prior to baking, control of fusing temperature of heat-sealing coatings, improvement of adhesion (using VMCH), and use of milled chips for pigmentation. These resins are usually dissolved in a lean mixture of glycol-ether and aromatic; a similar thinner composition being used in the organosol part of the formulation. Other methods of pigmentation are: charging of pigment directly into the mill and addition of pigment dispersions in plasticizer or compatible

(*Turn to page 36*)

Army Uses DeVilbiss Facilities For Spraying Test Panels

Newly developed coating materials for the military are being tested on 3,000 metal test panels at various points throughout the United States to determine resistance of the materials to the elements.

Army technicians in cooperation with paint manufacturers moved into the DeVilbiss Company's research laboratories last week to spray paint 1,000 panels each of aluminum, steel and magnesium.

The DeVilbiss facilities were utilized because the company had available the complete automatic spray finishing equipment to assure uniform film thickness of material being applied to the metal panels.

Most of the materials used were of the quick-drying nature and the panels were coated on both sides and air dried.

At military research laboratories, the coating materials will be tested to check results after immersion in water, exposure to salt spray and exposure to salt air atmosphere.

Each important step in the automatic spray painting procedure was recorded in color movies by Army photographers. The movies will be used for future instruction purposes.

•

Pliolite Supplies Increased

The Chemical Division of The Goodyear Tire & Rubber Company will increase supplies of Pliolite S-5 for the paint industry within the next six weeks.

Herman R. Thies, Division manager, in an announcement to the industry here said increased quantities of unmilled material would be available this month, while milled resins and pigmented base output would rise in January.

Increased allocations on this styrene-butadiene copolymer, Thies said, is made possible by additional production facilities and by an increase in the supply of raw materials.

•

New Corporation Name For Millmaster Chemicals

The name of Millmaster Chemical Corp. has been changed to Berkshire Chemicals, Inc. The offices of the company will remain at their present location in the Graybar Building, 420 Lexington Avenue, New York 17, N. Y., telephone number LExington 2-5959.

NEW YORK PAINT AND VARNISH PRODUCTION CLUB OFFICERS

Officers for 1951-1952 season. Left to Right: J. Congleton, treasurer; E. Santoro, secretary; E. Dale Albert, vice pres.; H. Hillman, president.

Harold Davis of D. H. Litter Company on left presenting gavel to Herbert Hillman, elected president. Gavel is gift from Nuodex Company.

N. Y. Club Inducts New Officers for Coming Year

The New York Paint and Varnish Production Club held its regular November Meeting on Nov. 8th with 190 members and guests in attendance. Program for the evening included induction of officers of the club and a premiere motion picture presentation of the June outing at Jumping Brook.

The slate of new officers include Herbert Hillman as president, E. Dale Albert as vice president and chairman of the program committee, N. W. Santoro as secretary and John Congleton as treasurer.

The chairman of the Technical Committee, Carl Englehardt gave his annual report. Carl had something to be proud about as both papers presented at the Atlantic City Convention this month succeeded in winning some prizes.

Henry Payne, chairman of the Mattiello Memorial Committee reported that 38 new books had been added to the Mattiello Memorial collection at Brooklyn Polytechnic Institute and that the fund had almost reached $3700. The interest from the fund is used to buy new books to add to the collection.

The evening activities wound up with the showing of the moving pictures taken at the outing in June of this year and a re-showing of a similar film taken in 1939.

JOHN M. HAMILTON

J. M. Hamilton Elected V. P. Of Binney & Smith Company

Mr. John M. Hamilton has been elected vice president of Binney & Smith Co. Mr. Hamilton joined Binney & Smith Co. as a salesman after graduation from Yale in 1933. In 1939 he was made assistant sales manager and advertising manager. This assignment was interrupted during World War II by some three years service with the U. S. Navy which he entered as a Lieutenant (j. g.). Rejoining Binney & Smith he continued in his previous position until 1946 when he assumed the duties and titles of assistant to the president and sales manager of the Carbon Black Division.

In 1950 Mr. Hamilton became a director of the company and manager of pigment sales. He will combine these assignments with his new duties as vice president.

•

ADM Announces Expansion In Los Angeles Area

Purchase of a tract of land in the Los Angeles' Central Manufacturing District has been announced by T. L. Daniels, president of Archer-Daniels-Midland Co.

This property, which lies near the Santa Ana Freeway between Garfield Avenue and 26th Street, will be used for a new processing plant. The new plant, scheduled for completion by September, 1952, will produce bodied oils, chemically modified oils and Progressive Varnish products.

J. B. Wiesel (left), Hercules Powder Company and Charles Bogin, Commercial Solvents Corp., study a display of the original hot-spray equipment at the recent Paint Show. This was a part of the cooperative exhibit on hot-spray lacquer sponsored by twelve firms engaged in the field.

Heyden and Shawinigan to Produce Basic Paint Materials

Heyden Chemical Corporation and Shawinigan Chemicals Ltd., have formed a new Canadian company which will manufacture initially formaldehyde and pentaerythritol.

Heyden and Shawinigan will share fifty-fifty in stock ownership of the new company which construct a 2 million dollar plant at a site to be selected in Canada, with annual capacity for production of 30 million pounds of formaldehyde and 3 million pounds of pentaerythritol, a solid alcohol made from formaldehyde which is the base for the new quick-drying, weather resistant paints, varnishes, resins and lacquers now specified for Navy ships, Army tanks, jeeps, bombs and hundreds of other defense uses. Production of additional chemical products is planned later.

•

Shell Chemical Builds Sulfur Recovery Plant

In a move aimed at alleviating the critical shortage of sulfur and its most important compound, sulfuric acid, Shell Chemical Corporation will add to its Houston operations a unit for recovering sulfur from waste refinery gases, it was announced recently by W. P. Gage, vice president. Output of the new unit will be sold for conversion to sulfuric acid.

Sulfuric acid, or oil of vitriol, is so fundamental a chemical with so many varied commercial uses (chemicals, oil, steel, paper, fertilizers, paints, to cite a few) that its total consumption provides a pertinent index of the industrial activity of any nation.

The new sulfur recovery unit, certified by the Government as a necessary defense project, will be constructed by the Ralph M. Parsons Company of Los Angeles. Operation is expected by mid-1952. In the recovery process, waste refinery gases, containing hydrogen sulfide, carbon dioxide and a small percentage of light hydrocarbons, will be burned and catalytically converted to sulfur at an annual rate in excess of 13,000 tons.

•

C. Jackson of Beckwith-Chandler Honored by Army

Charles M. Jackson, head of the marine laboratory of Beckwith-Chandler Co., Newark, N. J., division of Devoe & Raynolds Company, Inc., has been honored by the U. S. Army for patriotic civilian service to the Department of the Army during World War II.

At ceremonies held at First Army Headquarters, Governor's Island, Jackson received a certificate of appreciation from Lieutenant General Willis J. Crittenberger on behalf of Secretary of the Army, Frank Pace, Jr.

Jackson, as a member of the joint Chiefs of Staff Technical Industrial Intelligence Committee, investigated German paint products just prior to the end of World War II. He also tested and manufactured equipment associated with the paint industry for the Combined Intelligence Objective Sub-Committee, G-2 Division, SHAEF.

ALFRED H. DREWES

A. H. Drewes Elected Vice-Pres. Of National Lead Company

Alfred H. Drewes was elected a vice-president of National Lead Company. Mr. Drewes became a member of the board of directors and the executive committee in October of last year. He has been assistant to the president of the company since 1947 and is a director of Baker Castor Oil Company and of Titanium Metals Corporation of America. Since joining the company sixteen years ago, Mr. Drewes has held various positions in the accounting, auditing and administrative operations of the company.

•

Price of Silicone-Alkyds Reduced

Prices on silicone-alkyd coating resins were cut from 14 to 38% by the Plaskon Division, Libbey-Owens-Ford Glass Company and a company official predicted that this downward price trend would continue until silicone-alkyds eventually compete price-wise with standard organic coating resins.

•

Plaskon Promotes Donald Delaney and V. Ginsler

Promotion of Donald Delaney to sales manager for coating resins and of Victor W. Ginsler to assistant sales manager for that group of products has been announced by Carleton Ellis, Jr., director of sales of the Plaskon Division, Libbey-Owens-Ford Glass Company.

Mr. Ellis stated that the moves would bring added technical experience and ability to the sales direction of these products and should not only provide users with greater technical service, but increase the degree of liaison between Plaskon sales, research and production activities; a coordination necessary to the continued development and more efficient production of new and improved Plaskon resins.

•

Richard Huber Named Mgr. of Hercules Cleveland Office

Richard L. Huber has been named manager of the Cleveland office of the Cellulose Products Department of Hercules Powder Company.

In making the announcement, the chemical company added that the office, located at 925 Euclid Avenue, Cleveland, will be an independent branch office. Up to now, it has been under the supervision of the department's office in Detroit, Michigan.

The area now under Mr. Huber's supervision will include Cleveland, Akron, and Pittsburgh, Pa. Buffalo and Rochester, N. Y. will continue to be served by the Detroit office.

•

Coating Salesman Added To Dow Chemical Co.

John C. Young has been added to the Cleveland office of The Dow Chemical Company as a coatings salesman for the area.

Young, a native of Cleveland and a graduate of Kenyon College, recently completed training courses in the company's coatings technical service and plastics sales departments.

•

H. M. Johnson Announces Chemical Marketing Firm

Harold M. Johnson has announced the formation of H. M. Johnson, Inc., at 272 North Broad St., Elizabeth, N. J. The new concern will specialize in all phases of marketing chemical raw materials to manufacturers of paints, varnishes, lacquers, printing inks and allied industries. The company will undertake marketing research projects, offer a complete advertising and sales promotion service and will do the actual selling on a national basis for certain firms while functioning for others as a manufacturer's agent in the New York area only.

•

United Lacquer to Triple Research Facilities

In order to better serve America's expanding manufacturing program, now stimulated by defense needs, the United Lacquer Manufacturing Corporation will triple its research facilities.

The firm's research expansion will be accomplished by the construction of a new laboratory building and by taking over an area in an existing factory building now used for other purposes.

Industry's increasing demand for quality finishes and protective coatings prompted the decision to enlarge the company's research and development program.

An important objective of the expanded research facility will be to originate new materials for government agencies particularly for defense projects.

Special development projects also will be instituted in behalf of the textile printing, laminating and plastics industries. Work in behalf of the building, electrical, furniture and wood products industries will be continued.

In addition to conducting general research and formulation of new materials, United Lacquer makes its facilities available for solving customers' specific finishing problems.

•

S. A. Fine Named to Research Staff of Midland Finishes

Midland Industrial Finishes Company announces the addition to its staff of Mr. Saul A. Fine as a Research Group Leader. Mr. Fine comes to Midland from Monsanto Chemical Company in Everett, Mass. where he specialized in research and development on various types of industrial finishes.

•

A. C. Mueller Represents Metals Disintegrating Co.

The appointment of A. C. Mueller Company, Cleveland, Ohio, as representatives in the Cleveland area for the distribution of metallic pigments, has recently been announced by Metals Disintegrating Company, Inc., Elizabeth, N. J. manufacturers of metal powders, metal pigments and metal abrasives.

•

Venuto Talks Before Two Texas Clubs

L. J. Venuto, research director of Binney & Smith Co. addressed the Houston Paint Production Club on November 13th and the Dallas Paint Production Club on November 15. His subject in both cases was "Carbon Black and the Influence of the Vehicle as the Dispersing Medium."

•

W. N. Oldham Named Mgr. of Cyanamid's California Plant

Dr. W. N. Oldham has been appointed manager of American Cyanamid Company's Azusa, California plant. Dr. Oldham who joined the company in 1939 as a chemist at the Stamford, Connecticut Laboratories, began work at Azusa as chief chemist in 1945. He has been assistant plant manager since 1950.

ANDREW SCHOR

A. Schor Heads Resins and Solvents Sales for Velsicol

The Velsicol Corporation announces the appointment of Andrew Schor as Sales Manager of their resin and solvents division. Prior to this appointment, Mr. Schor was head of the Technical Service Division. He has been with the Velsicol Corporation six years and began his employment as a development chemist.

•

New Plant for Hellige

Dr. P. A. E. Hellige, President of Hellige, Inc., prominent manufacturer of scientific instruments for medicine, industry, and public health, has announced plans for increased production capacity. The new plant, now under construction on a 10-acre tract on Stewart Avenue, Garden City, Long Island, N. Y. is expected to start operation in February, 1952. Hellige, Inc. will continue to operate two plants in Long Island City and Mineola, N. Y.

•

Protective Finishes Research Program

American Chemical Paint Company, Ambler, Pennsylvania, announced that it has recently undertaken a research program under contract with the Office of the Quartermaster General, Washington, D. C.

The scope of the program will be the investigation and development of prepaint treatments and final chemical treatments of metal surfaces, for the protective finishing of designated Quartermaster articles of supply. The items to be studied include metal containers and equipment hardware.

Harry Faigen of the American Chemical Paint Company is conducting the studies and the operations of the laboratory established for this government project. From the Office of the Quartermaster General, Joseph P. Urbanek, Chemical-Plastics Branch, Research & Development Division, is administering the technical phases of the work.

•

U. S. Government to Aid Glidden In Increasing Zinc Production

The United States Government has entered into an agreement with the Glidden Company to bear half the cost of exploratory diamond drilling on Glidden's zinc properties in Shasta County, California, Adrian D. Joyce, Glidden board chairman announced today.

In a contract signed by Dwight P. Joyce, Glidden president, and the Defense Minerals Administration, an agency of the government Glidden agreed to start diamond drilling operations on the property within 60 days.

Zinc, a strategic metallic element, has been in critically short supply for the past year and D.M.A. is anxious to increase domestic output for defense program requirements.

•

Blake Paint Corporation Opens Factory in Florida

Blake Paint Corporation recently opened a new manufacturing plant at 2494 South Kuhl Avenue in Orlando, Florida, it was announced by Dudley B. Blake, President. Executive offices will be maintained at this address.

The corporation was formed over a year ago to supply industrial finishes, consisting of lacquers, paints, synthetic enamels, thinners and vinyl coatings to manufacturers of wood, metal and plastic products.

•

Manly Fleischmann To Speak At Plant Maintenance Conference

Manly Fleischmann, administrator, Defense Production Administration, will head a group of 56 speakers in the most extensive discussion of plant maintenance problems ever undertaken, to be held at the Plant Maintenance Conference, Convention Hall, Philadelphia, Jan. 14–17, 1952.

The conference, which will be held in conjunction with the Plant Maintenance Show, will have as its general chairman L. C. Morrow, consulting editor, "Factory Management & Maintenance." More than 14,000 are expected to attend and 225 companies are expected to exhibit.

Metals Disintegrating Co. Appoints Distributors

The Charles L. Burk Co., Black Mountain, North Carolina and Truesdale Co. of Boston have been appointed distributors of MD Aluminum pastes and powders and MD Gold Bronze Powders, according to an announcement by Metals Distintegrating Co. of Elizabeth, N. J. Charles L. Burk Co. is the Southeastern distributor and the Truesdale Co., the New England distributor.

•

Recent Appointments at G-E Silicone Plant at Waterford

Recent appointments to the General Electric Chemical Division's silicone plant at Waterford, N. Y., include the following application engineers on prouct development:

John Thomas Goodwin, Jr., Frank J. Modic, Lloyd Steadman Nelson, Albert E. Horning, John J. Deasy, Maynard G. Noble, Ernest A. Link, Robert W. Schaefer, Edward J. G. Leikhim, David P. Spalding, and Timothy M. Maloney.

•

O & C Planning Additional Production of Solvents

Plant expansion for increased production of coal-tar derivatives, including toluol and aromatic aviation gasoline blending stock, is now under way, according to an announcement by Oil & Chemical Products, Inc.

•

Du Pont Finishes Names Beadles to New Position

Frank H. Beadles, assistant regional sales manager at Chicago of the Du Pont Company's Finishes Division, has been appointed to the newly created position of manager, Plants Technical Section of the division, the company announced recently.

Creation of the new position is designed to further an intensified technical program in the eight plants of the Finishes Division and coordinate the activities of the plant laboratories.

•

Commercial Solvents Corp. Names Breidenbach S. Francisco Mgr.

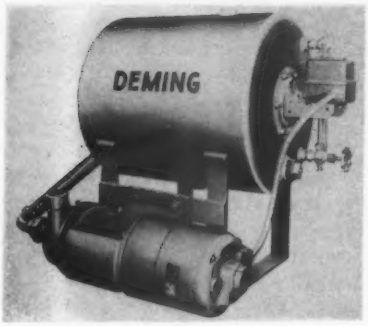
R. W. Breidenbach, formerly of the Company's Los Angeles Office, has been appointed San Francisco District Manager for the Industrial Chemicals Division of Commercial Solvents Corporation. In this newly-created position, he will report to E. W. Bacigalupi, Western Regional Manager.

More Candid Shots From Atlantic City Paint Conventions

1. A. E. Horn, A. C. Horn Co., looking over copy of PAINT & VARNISH PRODUCTION with Anthony Errico, editor.
2. Bakelite Booth.
3. Mr. & Mrs. Gus Westcott, President-elect Paint & Varnish Production Clubs.
4. Arthur Mullaly, Advance Solvents & Chemical Corp., W. Schwarz, Patch Bros.
5. Mr. & Mrs. H. A. McConaghie, McClosky Varnish Co., Hal Gough, Fennaren & Haley, Albert H. Stover, Felton-Sibley.
6. Harry G. Hoehler, H. T. Campbell & Sons Corp., Harry E. Outcault, St. Joseph Lead Co.
7. R. B. Shurts, National Association, Scientific Section, Paul W. Hardy, Paul W. Hardy Co.
8. Thomas J. Starkie, Robert Wishnik, James Cunningham, Howard Packer, Witco Chemical Co.
9. Homer Flynn, Sec'y, Federation; Howard G. Sholl, C. M. Atley Paint Co.; Robert W. Matlack, George W. Wetherill.

NEW PRODUCTS & IMPROVEMENTS

A MONTHLY MARKET SURVEY



DEMING

CONDENSATION UNITS

Equipped with Centrifugal Pumps

Known as "Motor-Mount," these new units effect savings in fuel by returning the condensate from steam coils, radiators, or steam operated equipment back to the boiler.

"Motor-Mount" centrifugal pumps are used on these units. These pumps have enclosed type bronze impeller and stainless steel shaft. The deep stuffing box has conventional packing rings for grease lubrication. Pump is mounted on the legs of the tank so no base is required.

Motor has standard NEMA type "C" mounting flange and is furnished for single phase, two or three phase or direct current, as specified. The Deming Co., Salem, Ohio. PVP—December.

CARNAUBA SUBSTITUTE

Low Cost

Domestic wax known as "Concord Wax No. 407" is claimed to successfully replace imported carnauba at a fraction of the cost. According to the manufacturer, this wax makes possible the production of a dependable water-wax emulsion. Its resultant emulsions are said to be translucent, light in color, highly stable, with good gloss and excellent durability. Concord Chemical Co., Moorestown, N. J. PVP—December.

FOAM MATERIAL

Protects Against Solvents

Mechanical foam is effective against polar solvents. Satisfactory with ethanol, methanol, isopropanol, acetone, ethyl acetate, etc. Material can be used with existing mechanical foam equipment and is effective against petroleum and other fires where foam is indicated. National Foam System, Inc., West Chester, Pa. PVP—December.

EDWIN L. WIEGAND

HOT PLATE

With Heat Control

Laboratory hot plate is equipped with graduated heat control. Acording to the manufacturer, the control switch permits variability of the first 50 percent of total wattage of the unit, making it possible to maintain continuously the desired temperature of liquids or other materials. Models rated between 660 and 2000 watts provide any desired surface temperature up to about 800 Deg. F. For further details write to Edwin L. Wiegand Co., 7632 Thomas Blvd., Pittsburgh 8, Pa. PVP—December.

VISCOMETER STAND

For Highly Plastic Materials

When used with a suitable Brookfield Viscometer fitted with a special bar-type spindle, this Brookfield Helipath stand makes it possible for the operator to secure consistency measurements in relative centipoise values of materials having characteristics similar to putty, gelatin or wax. This unit enables one to make viscosity measurements of many substances such as paint dyes, lithographic inks, etc., which heretofore were considered unsuited for viscosity or consistency measurements. Brookfield Engineering Laboratories, Inc., Stoughton, Mass. PVP—December.

CONSTANT TEMP. BATH

Precise Control

The constancy of bath temperature claimed for the new bath is plus or minus 0.005 degrees centigrade over its entire range of about minus 5 to plus 107 degrees centigrade. Actual tests have produced variations as small as two-thousandths of a degree over a long period of time.

The extreme constancy is of particular importance for laboratory work in making viscosity or density measurements.

A complete design change from conventional water bath employs an electronic circuit to control 400-watt and 800-watt heaters. Also, the heating elements, stirrer and controls are contained in a central column with all connections made through the bottom of the $15 \times 15''$ Pyrex brand glass bath—thus providing an unobstructed top surface for inserting samples.

Stirring is effected by a 1150 rpm. motor and propellers so that the entire 10 gallon water (or light mineral oil) content is constantly in motion. Fisher Scientific Company, 717 Forbes St., Pittsburgh 19, Pa. PVP—December.

NEW PRODUCTS

CLEANING COMPOUND

Degreases, De-rusts, Etches

Compound is reported to eliminate pickling in a number of metal working operations. Removes oil and rust from metal surfaces, prepares the surface for painting, and converts a thin layer to insoluble phosphates. Compound No. 33 is produced by the Oakite Products, Inc., 22 Thames St., New York 6, N. Y. PVP—December.

PLASTICIZER

For Nitrocellulose

Plasticizer for nitrocellulose can be used as a replacement for castor oil or in any percentage of mixture with castor oil. Tests indicate that this plasticizer imparts good flexibility to lacquer coatings, and is compatible with nitrocellulose, synthetic resins, and castor oil. Does not spew at high temperatures. Known as P-319, this plasticizer is available from Bonner Chemicals, Inc., 31 Spruce St., Leominster, Mass. PVP—December.

FIRE EXTINGUISHER

One-Hand Operation

One-hand operation is one of the characteristics of the pressurized portable fire extinguisher. It is sold under the trade name "Redi-Grip". According to the manufacturers, the range of this equipment exceeds 30 feet and the discharge time of 1 qt. size is about 27 seconds at 70 deg. F. Available in 1, 2½, and 4 quart sizes. Stop-Fire, Inc., 125 Ashland Place, Brooklyn 1, N. Y. PVP—December.

DRUM ROTATOR

Mixes and Blends

Drum rotator is used for mixing and blending materials in 16 to 24" diameter fiber drums. One man can move this device to the spot where it is needed, load it, and handle mixing operations. When mixing is completed drum is returned to the floor in the same way it was picked up. Rotator can be easily rolled to a new location on its casters. Morse Manufacturing Co., Inc., Syracuse, N. Y. PVP—December.

MARVEL

FILTER

75 and 100 g.p.m.

Hydraulic and low pressure liquid recirculating machinery which formerly required multiple installation of filters to gain adequate filter capacity may now get this capacity in a single unit, thereby simplifying maintenance. Seventy-five and 100 gallons per minute models are considered to be the highest capacity filters available, according to the manufacturer.

It is also claimed that because of its simple maintenance features with no moving parts to get out of order, great capacity in small space, plus room for foreign matter accumulation has resulted in longer periods of operation between cleanings and less down time for productive machinery. Marvel Engineering Co., 625 W. Jackson Blvd., Chicago 6, Ill. PVP—December.

MAGNIFIER

Simplifies Thermometer Reading

Magnifier which simplifies thermometer reading is equipped with a pair of spring clamps. It is easily snapped onto any standard thermometer. It can be moved up or down to any desired position to magnify a full two inch section of the thermometer. Fisher Scientific Co., 717 Forbes St., Pittsburgh 19, Pa. PVP—December.

ALIPHATIC AMINES

Diversified Uses

New amines are designated Alkylamine JM-R, Alkylamine JM-T and Alkylamine 81-T. Alkylamines JM-R and JM-T are refined and technical grades of a tertiary alkyl amine averaging 18 carbon atoms in length. The new amine acetate is the derivative of Alkylamine JM-T. Alkylamine 81-T is a technical grade of the previously announced Alkylamine 8-R, a refined tertiary alkyl amine containing 12 to 15 carbons. Also available in the series is tertiary octylamine, an eight carbon, refined grade.

The Alkylamines are all highly branched amines, and have the tertiary-alkylamine (tertiary-carbinamine) structure, in which the nitrogen atom is directly attached to a tertiary-alkyl group. With the exception of tertiary-octylamine, which is a pure compound (2,4,4-trimethyl-2-aminopentane), all are mixtures of isomeric products. The branched chain structure imparts distinctive properties, among which are: improved solubility in paraffinic solvents (where straight chain amines tend to gel), improved surface activity of the salts, and improved handling properties of the amines and their salts. For example, all the amines are clear, fluid liquids, easily poured at all temperatures, while Alkylamine JM-T Acetate is a rather viscous liquid. The refined amines are light amber in color, while the technical grade products are reddish-brown. Color stability is excellent. The tertiary-alkyl structure also modifies the reactivity of the amines, and the chemical properties of reaction products.

In addition to the applications mentioned above, these amines should be considered as such, or as intermediates, in the fields of corrosion inhibitors, bactericides, insecticides, fungicides, wetting agents, detergents, textile finishing agents, emulsifiers, pharmaceuticals, stabilizers, and for the introduction of oil-soluble groups into anti-oxidants and other oil additives.

Samples and technical literature describing physical properties and experimental directions for the reactions of these amines are available from Department SP, Rohm & Haas Company, Washington Square, Philadelphia 5, Pa. PVP—December.

NEW PRODUCTS

VINYLTOLUENE

Styrene Substitute

Pilot plant quantities of isomeric mixture of m- and p-vinyltoluenes are now being produced. According to the manufacturer, the purity of this monomer is more than 99% and as a result can be substituted for styrene in paints, varnishes, plasticizers, rubbers, latices and resins.

Comparing the properties of this monomer to styrene: its polymerization rate is twice as great; its vapor pressure is substantially lower. Dow Chemical Co., Midland, Mich. PVP—December.

WAX ESTER

Resin Modifier

Wax Ester No. 60, petroleum derivative is used in the manufacture of greases, plasticizers, wetting agents, and may be used as a synthetic resin modifier. Petrolite Corp., 30 Broad St., New York, N. Y. PVP—December.

STUBS FORKS

Speeds Drum Handling

Fork trucks have been modified by a chain manufacturer in a way to make drum handling easier. This firm worked out its own special attachment which consists of a stub fork mounted on the truck carriage which slips under the load, and a latch that grips the rim of the drum to hold it securely. Baker-Rauling Co., 1250 W. 80th St., Cleveland 12, Ohio. PVP—December.

SURFACE ACTIVE AGENT

For Latex Paints

Known as "R&R 551 Interface Modifier," this product holds special interest to manufacturers of latex paints. It is a colloidal surface active agent with excellent pigment dispersing properties in latex paint formulations. It also serves to stabilize latex paints and reduce foaming. The product has been tested for 18 months and excellent results have been reported. The use of 1–2% of this chemical is most effective. Ross & Rowe, Inc., 50 Broadway, New York 4, N. Y. PVP—December.

CONTINUOUS MILL

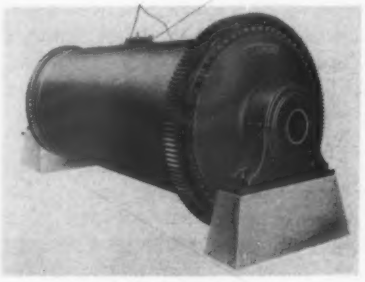
Heavy Duty

Heavy duty continuous ball or tube mill has improved mechanical features, which are declared to insure economical and reliable continuous grinding operation under the most severe conditions, with costly shutdowns being entirely eliminated and maintenance expense reduced to a minimum.

It is adaptable to fine or coarse grinding, wet or dry grinding, open or closed circuit grinding.

The manufacturer states that the mill may be used to deliver a finished product, or it may be operated in conjunction with Patterson classifying equipment of various types. Hollow trunnions are provided for continuous feed and discharge of materials.

A descriptive bulletin on the new Patterson Continuous Ball and Tube Mill may be obtained from this publication, or by writing direct to the Patterson Foundry & Machine Company, East Liverpool, Ohio. PVP—December.



PATTERSON

CARNAUBA SUBSTITUTE

High Gloss

In many physical and chemical characteristics, Parwax is remarkably similar to imported Carnauba. In standard wax-oil mixes, it registers a melting point and viscosity index which compare quite closely with those of the imported Carnauba.

Moreover, the gloss readings for Parwax mixes are considerably higher than those for Carnauba mixes, indicating that it is capable of producing a very shiny polish without buffing.

Technical information on this wax may be obtained by writing to Concord Chemical Company, Moorestown, New Jersey. PVP—December.

POLYAMIDE RESINS

Heat-Sealing Types

Six new compounds have been added to company's line. They include Resin No. 90, No. 90S, No. 93S, No. 94S, No. 95S and No. 100S. These may be used alone or as modifiers for other resinous products.

Resin No. 90 is described as a hard, tough and brittle resin, made by the copolymerization of di- and tri-linoleic acid and other acids with ethylene diamine. Addition of small amount of antioxidant to Resin 90 or to other General Mills polyamides is said to produce stabilized products designed as No. 90S, No. 93S, No. 94S, and No. 95S. At high temperatures, these stabilized resins are claimed to have a gel time approximately three times longer than the standard polyamides. Because of their heat resistance, the stabilized resins are recommended for use in hot melt applications.

Polyamide Resin 100S is said to be soft, tacky, plasticizing type resin. General Mills Research Laboratories, 400 Second Ave., South, Minneapolis 1, Minn. PVP—December.

CHLORINATED RUBBER

New Grade

Stabilized grade of chlorinated rubber will give paint manufacturers a marked improvement in heat and light stability, better weathering, and a reduction in under-film rusting, according to the manufacturer.

Stabilized Parlon (Hercules chlorinated rubber) retains the natural advantages of the original product, which has been used for many years as a base for industrial maintenance paints. These paints are especially resistant to alkalies, acids, fumes, and other corrosive elements that attack metal surfaces.

The new form of Parlon contains a small amount of an epoxy-type stabilizer that is water-insoluble, and readily compatible with the resins and solvents normally used in formulating the finished paints.

Hercules reported that paints made from the new stabilized Parlon also have better "can stability"—minimizing corrosion of the interior of metal containers in which Parlon-base paints are packaged. Hercules Powder Co., Wilmington, Del. PVP—December.

NEW PRODUCTS

WAX EXTENDER
Insoluble in Water

Emery C-842-R Stearone, in experimental quantities. It is a white, crystalline solid, with a melting point of approximately 75° C. It is insoluble in water and only slightly soluble in hot alcohol or ether.

The wax-like character of Stearone suggests its use as a wax or wax extender.

A descriptive bulletin and an experimental sample are available on request from Emery Industries, Inc., Dept. 5, Carew Tower, Cincinnati 2, Ohio. PVP—December.

DAYLITE ILLUMINATOR
Used With Comparator

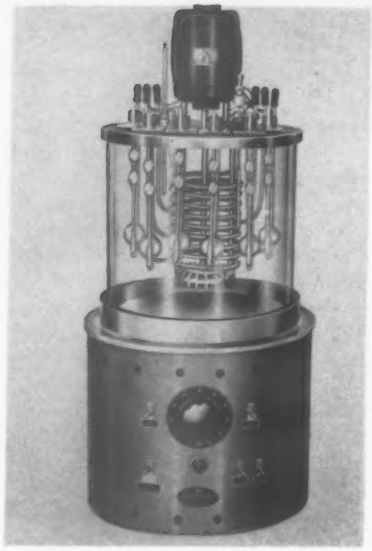
Illuminator provides the most suitable light for colorimetric work and insures reproducible results independent of time or weather. It is equipped with a specially coated bulb and Corning Daylite Glass Filter and should not be confused with lamps using an ordinary bulb or blue glass plate. The Illuminator in a ventilated metal housing measures 3¾ × 4¾ × 3¾ inches and has a sloping front to hold the Comparator at an angle of 45° for increased ease of operation. For further information on this product and the Hellige Varnish Comparator, write to Hellige, Inc., 3718 Northern Boulevard, Long Island City 1, N. Y. PVP—December.

DIESEL TRUCK
Reduces Sparking Dangers

Diesel power for the Yardlift-40 fork-lift is available and the primary purpose of offering diesel power is to effect fuel-cost savings.

Major specifications, such as 85½" turning radius, overall width of 41¾", length, etc., remain the same with the new engine as for the present Yardlift-40. The only operating changes will be the minor ones associated with diesel operation.

Elimination of an ignition system reduces sparking dangers in areas of high inflammability—another advantage of diesel power, though the new installation cannot take the place of a fully spark-proofed vehicle. Clark Equipment Co., Battle Creek, Mich. PVP—December.



EMIL GREINER

TEMPERATURE BATH
For Capillary Viscosimeter

Unitized constant temperature bath for use with capillary viscosimeters is designed with a new turbine type stirrer, the Kinematic Viscosity Bath provides perfect temperature control and distribution without air entrainment. The liquid medium is thoroughly and rapidly agitated without any surface turbulence to mar observations.

A feature of the Kinematic Bath is the use of a new type holder. This holder permits free insertion of a tube in the chuck-like grip without any danger of breaking the viscosimeter or injuring the operator. Emil Greiner Co., 20 N. Moore St., New York, N. Y. PVP—December.

RUBBER LATICES
Four Synthetic Types

Four new synthetic rubber latices, each "tailored" to meet specific requirements are now available. These new additions to the line of Chemigum latices are aqueous dispersions of butadiene-acrylonitrile coplymers designed particularly for use in coating, impregnating, and compounding applications requiring unusual adhesion or resistance to oils, grease, alcohols and most solvents.

In the 235 series, Chemigum Latex 235AHS, Chemigum Latex 235C and Chemigum Latex 235 CHS have been added to expand possible applications. The 235 series is characterized by a butadiene to acrylonitrile ratio of 55/45. Latex 245 AHS has been added to the 245 series, characterized by a butadiene to acrylonitrile ratio of 67/33.

The alphabetical designations within each series refer to the type of stabilization. In the 235 series, Latex 235AHS is a high solids modification of the popular Latex 235A and is stabilized with an ammonia soap. Latex 235C and Latex 235CHS contains a synthetic anionic stabilizer to insure stability in processes which tends to increase the hydrogen ion concentration of the latex. A typical use is in saturating processes where the impregnant is deposited by repeated passes of a web through the bath without coagulation of the Latex.

Within the 245 series, Chemigum Latex 245A now has a high solids counterpart in Chemigum Latex 245AHS. The high solids latices give a greater solids pick up in some processes and are more economical to ship and store.

For reference by industry, Techni-Guide CL-235-1 and Techni-Guide CL-245-I, revisions of previous literature, contain information and technical data about the complete 235 and 245 Chemigum Latex families. Goodyear Tire & Rubber Co., Chemical Div., Akron, Ohio. PVP—December.

DRUM HANDLING DEVICE
Adaptable to Any Fork Truck

Horizontal drum handling device can be attached to any industrial fork truck without removing the forks or making any hydraulic or mechanical connections. Completely automatic, the new device is said to be a self-contained unit that fits over the fork. Yale & Towne Manufacturing Co., Philadelphia, Pa. PVP—December.

HAND CLEANER
Waterless Type

Waterless cleaner is said to remove dirt, grime, paint, and asphalt and other industrial compounds. Dirt and cleanser can be wiped off with paper towel or cloth. The Boyer-Campbell Co., 6540 St. Antoine St., Detroit 2, Mich. PVP—December.

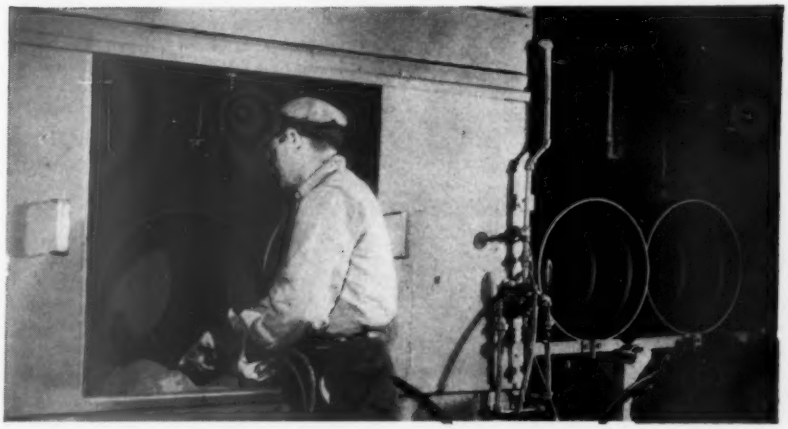
protects containers

protects contents

PRODUCE A FINISH that serves where others fail! That's the achievement of these drum-lining finishes based on VINYLITE Brand Resins!

Keys to such success are the inherent flexibility and the lasting adhesion of these highly chemical-resistant resins which protect containers from contents as well as contents from containers. Simple cleaning puts the containers back in service over and over again.

Coatings based on VINYLITE Brand Resins are widely used in the petroleum, chemical and processing industries on tanks, pipes, valves, structures, equipment. Preserving metal and slashing maintenance costs, they remain unaffected for years by oils, greases, water, salt, corrosive atmospheres, alkalies, and most strong acids.



Spraying lining material on drums. Data on Gaco Drum Lining courtesy Gates Engineering Company, P. O. Box 1711, Wilmington, Del.

They withstand impacts that dent and deform metal surfaces. They do not chip, peel, or flake. Odorless, tasteless, non-flammable, they come in many colors and are strongly resistant to sunlight, mildew, fungi, and aging.

For technical assistance in formulating metal, concrete, and other coatings based on VINYLITE Brand Resins, write Dept. LB-75.

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abstracts

Adhesion

Thinius, K. Presented before the March Meeting of the Chamber of Technic, Berlin, Germany.

The questions and problems surrounding the adherence of varnish, lacquer and paint films on metallic and non-metallic surfaces as well as on one another (top coats on priming coats, etc.) was not very serious from a technical and practical aspect as long as the chief raw materials used had been linseed oil, stand oil and other derivatives. However, during the last 10 or 15 years an interesting development has taken place, synthetic resins, vehicles and other raw materials in increasingly growing varieties have, among numerous other problems, introduced entirely new problems of adherence not only between paint and varnish films on other substrate but among themselves.

Numerous studies and investigations have been conducted and their results published. A careful analysis of all this work enables us to boil down practically all factors of importance to one practical chief factor, *polarity*. It is the polarity of each and every substance which determines the degree of adherence. It is true that the practical painter can enforce a certain degree of adherence even if the polarity of the priming and top paints or varnishes does not agree by adding solvents of large wetting capacity to both materials. Another method is to add solvents of a very large solvent capacity such as cyclohexanone and methyl cyclohexanone. It is possible, for instance, to obtain a certain amount of adhesion between nitrocellulose lacquer films and polyvinyl chloride films by adding these solvents, in spite of the fact that these two materials are of directly opposite polarity. The kind of adhesion obtained thereby is not satisfactory, however; besides, the structure of the films within the zones of adhesion is changed in a manner calculated to deteriorate the general properties of the total film, while the solvent is retained for a very considerable time.

Polyisobutylene and polystyrene also are non-polar film forming substances and therefore develop insufficient adherence in connection with the polar nitrocellulose combinations.

A very interesting method of using valuable paint materials of different polarity without disadvantage of insufficient adhesion is the intelligent use of intermediate films composed so as to balance the different polarities of the priming and top films. The enormous development of the high-polymers have enabled us to produce molecules containing polar and non-polar groups of all possible varieties, which can be employed for this purpose. The most simple way is that of mixed polymerization, for instance between vinyl chloride and vinyl acetate. Vinoflex PCU S3 or other correspondingly re-chloridized products are mixed polymers of this type. Polystyrene can also be incorporated on similar principles as polyvinyl chloride. All this applies to different layers of paint films.

Similar conditions prevail where the surfaces to be protected are of different polarity. For instance in painting synthetic leather the polar nitrocellulose cannot adhere to the non-polar. However, if an intermediate film of some substance such as vinyl iso-heptylate is applied, high adhesion is at once attainable. The hydrocarbon radical (heptyl) adapts itself to the polarity of the polyisobutylene while the vinyl radical (the CO-group) induces adhesion to the nitrocellulose film.

Still more interesting is the protective varnishing of polyamide driving belts. It cannot be expected to have the chemically resistant chlorinated rubber films adhere to the strongly polar polyamide, although the life of the belts would be considerably prolonged by their application. Since it is practically impossible to find a common solvent for these two substances, it is possible only to apply a triple mixed polymer as an intermediate film. A mixed polymer consisting of 75 per cent of vinyl chloride and vinyl acetate and 25 per cent of acrylic acid butyl ester has been found very satisfactory for this purpose.

Pigment Particle Surface

E. J. Dunn, Jr., National Lead Co., Brooklyn, N. Y. Presented before the Paint, Varnish and Plastics Div. of the American Chemical Society, Sept. 3–7, 1951, New York.

An attempt has been made to resolve the surface structure of a specially fabricated pigment particle, basic silicate white lead 45X. Chemical microscopy, x-ray, electron diffraction, electron microscopy settling tests, chemical reactivity tests, phase microscopy, and extraction tests were used to resolve the surface structure.

The evidence shows there is a definite coating of the monobasic lead silicate and monobasic lead sulfate on a silica core. The coating is attached by a bond that strongly resists being broken mechanically. The bond appears to be due to the formation of the monobasic lead silicate. The thickness of the coating, as a mass effect, is readily noted microscopically on fractured particles; however, diffraction effects interfere with a good microscopical measurement of the thickness. The coating is rough surfaced, with the monobasic lead sulfate and monobasic lead silicate being intimately dispersed on the surface of the silica particles.

Accelerated and Outdoor Weathering of Colored Vinyls

F. G. Clark, Bakelite Co., Div. of Union Carbide & Carbon Corp., Bound Brook, N. J. Presented before the Div. of Paint, Varnish and Plastics Chemistry of the American Chemical Society, Sept. 3–7, 1951, New York.

The weathering resistance of a series of commercial colored plasticized vinyl films has been studied under 12 outdoor weathering conditions, including tests at four seasons in both Bound Brook, N. J., and Miami, Fla. Some tests under glass and with various backgrounds are also included. The series was also rated in a modified XIA Weather-Ometer and in an FDA-RFade-Ometer. Films were rated for both color fading and time to decomposition of the base compound with emphasis on the color fading.

Correlation studies of the outdoor tests at various seasons and accelerated tests with outdoor tests were made using sunlight data obtained with a pyrheliometer as the basis for outdoor data.

Outdoor tests vary greatly from season to season, with a great variation in Bound Brook, N. J., tests than in Miami, Fla. For fading of colors the Fade-Ometer showed best correlation for exposures under window glass.

The XIA Weather-Ometer fades color of vinyl films at about 1.5 times the rate of the Fade-Ometer and is, therefore, a better accelerated test. Where both fading of colors and compound decomposition are important, the XIA Weather-Ometer is the more reliable unit because it fades and degrades compounds at the same rate compared with outdoor Florida tests. The Fade-Ometer decomposes vinyl films at a faster rate than it fades colors.

The satisfactory behavior of a material

(*Turn to page 34*)

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in air-dry and baking oleoresinous protective and decorative coating vehicles.

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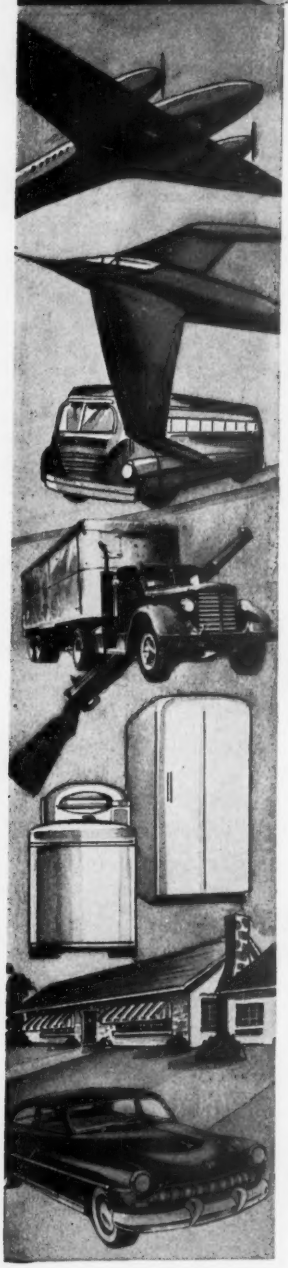

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"GRANODINE"® forms a zinc-iron phosphate-coating bond on sheet metal products—automobile bodies and fenders, refrigerator cabinets, etc.—for a durable, lustrous paint finish.

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"ALODINE",® the new ACP protective coating chemical for aluminum, anchors the paint finish and protects the metal.

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"THERMOIL-GRANODINE"® a manganese-iron phosphate coating chemical, forms on steel a dense crystalline coating which, when oiled or painted, inhibits corrosion.

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The oiled "THERMOIL-GRANODINE" coating on pistons, piston rings, cranks, camshafts and other rubbing parts, allows safe break-in operation, eliminates metal-to-metal contact, maintains lubrication and reduces the danger of scuffing, scoring, galling, welding and tearing.

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"GRANODRAW"® forms on pickled surfaces a tightly-bound adherent, zinc-iron phosphate coating which facilitates the cold mechanical deformation of steel, improves drawing, and lengthens die life.

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NEWS DIGEST

Celanese Plans New Laboratory in Texas

Celanese Corporation of America will shortly begin construction of a new and modern main laboratory building at the Clarkwood, Texas, petroleum chemical research and development center at a cost of approximately $500,000.

The appropriation for the project, which will supplement present facilities, has already been approved, and it is estimated that the building may be in operation within a year. It will be provided with specially designed laboratories suitable for different types of research work on the production of chemicals from petroleum raw materials, and will also include facilities for the use of modern physical analytical equipment involving infrared, ultra violet and mass spectrometric techniques.

•

Morehouse Sponsoring Research Project

Dr. Stewart J. Lloyd, Dean of the School of Chemistry, Metallurgy, and Ceramics at the University of Alabama announced a research project to be carried out at the university under the sponsorship of Morehouse Industries, Speedline machine manufacturers of Los Angeles.

The project will be developed under the auspices of the University's new paint and protective coatings department headed by Andrew J. Snyder, assistant professor of chemistry.

The Los Angeles machinery company will test a number of paint and pigmented coating systems with its milling equipment using special Carborundum grinding stones. Results of the tests will determine the effects of the particle size of the Carborundum in the stones, rate of feed, components of various systems, viscosity of feed material, effect of vehicle solids on the handling of the material, use of wetting agents and dispersion aids, and other pertinent data beneficial to industry using this equip-

•

Kahn Joins Technical Staff of Witco Chemical

Samuel Kahn has recently joined the technical staff of Witco Chemical Company's research laboratory in Chicago as a group leader. Mr. Kahn obtained his master's degree at M.I.T. in 1947 and comes to Witco from Godfrey L. Cabot, Inc.

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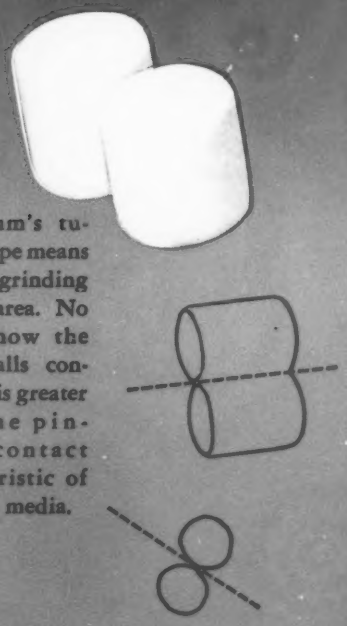

Burundum's tubular shape means greater grinding contact area. No matter how the media falls contact area is greater than the pinpoint contact characteristic of spherical media.

YOU practically double ball or pebble mill capacity when you use Burundum Grinding Media instead of flint pebbles. These unique, tubular-shaped grinding media, users say, actually cut ball milling time in half. One user reports yellow zinc chromate solution ground to a North Gage reading of "6" in 44 hours with Burundum. Flint pebbles took 90 hours. In another test Burundum ground a gray enamel to a reading of "7 plus" in 42 hours. Pebbles took 80.

Burundum is a hard, heavy non-metallic material. Its specific gravity is almost twice that of flint. Its hardness rating on the Mohs Scale is 9. (Compared to 10 for the Diamond.)

Despite its hardness, Burundum is exceptionally tough. Its resistance to chipping, its slow wear, the non-contaminating nature of the material itself, means less impurities in the mix. You can even grind whites with perfect safety. Burundum Grinding Media means lower cost ball milling — better grinds in half the time.

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ABSTRACTS

(*From page 30*)

outdoors is the primary objective of all weathering studies, and although there is a statistical correlation with some accelerated tests, there are wide exceptions which only the outdoor test can show.

Stabilizing of Chlorinated Vinyl Polymers

R. E. Lally, Ferro Chemical Corp., Bedford, Ohio. Presented before the Paint, Varnish and Plastics Div. of the American Chemical Society, Sept. 3–7, 1951, New York.

Wide variations in the structure of commercial vinyl chloride polymers and copolymers, and the increased range of application of such resins, have caused the problem of stabilization to become more complex. However, greater understanding of vinyl degradation reactions has made it possible to stabilize most resins for proper commercial application.

The effect of resin structure on processing and degradation is considered along with the basis causes of deterioration. The major classes of stabilizers are reviewed with data showing their relative activities in polyvinyl chloride and polyvinyl chloride-acetate resins.

Results of the use of zinc compounds are shown in comparison to the activity of cadmium compounds, and theories are advanced to explain the excellent action of such materials in both heat and light stabilization. Simple stabilizer systems employing the synergistic action of cadmium and zinc compounds with barium and epoxy compounds are discussed, and data are presented illustrating the results of such activity.

Protective coatings manufacturers save alcohols and modifiers by using Poly-pale

This polymerized wood resin saves money and gives excellent results in gloss oils, metallic driers, ester gums, modified maleic resins, oleoresinous varnishes, and spirit varnishes.

Poly-pale is a high-melting, light-colored resin with lower acidity than gum or wood rosin —requires less glycerin or other alcohols to produce desired esters.

Poly-pale has excellent solubility in most organic solvents, does not crystallize from solution . . . resists oxidation and discoloration . . . holds color well when heated . . . provides good hardness and drying time . . . imparts higher viscosity than comparable gum or wood rosins.

In addition to Poly-pale, 5% and 6% Limed Poly-pale Resins are also available now. Write to Hercules for technical information and testing sample.

HERCULES POWDER COMPANY Naval Stores Dept., 926 Market St., Wilmington, Del.

Organosols From Vinyl Resins

G. M. Powell, T. E. Mullen, K. L. Smith, and D. E. Hardman, Carbide & Carbon Chemicals Div., Union Carbide and Carbon Corp., South Charleston, W. Va. Presented before the Paint, Varnish and Plastics Div. of the American Chemical Society, Sept. 3–7, New York.

The organosols based upon polyvinyl chloride-type resins suspended in organic liquids have achieved considerable commercial importance in recent years in both the coatings and the plastics industries. Several different grades of dispersion resins are now available from various resin manufacturers, and these vary considerably in ultimate particle size, composition, molecular weight, and other properties. The organosol technique is broad in its applicability, however, and is already being extended to other types of high polymers, notably to copolymers of vinyl chloride and acrylonitrile and to polychloritrifluoroethylene.

Some of the factors in the formation and use of organosols are reviewed, with particular emphasis upon the performance differences between the various commercial grades of vinyl chloride-type resins. Factors such as optimum dispersant-diluent ratios, ease of dispersion, and temperatures required for final fusion to strong films are discussed and illustrated by experimental data. Plastisols, or resin-plasticizer pastes, are mentioned briefly and a correlation between plastisol viscosity and plasticizer viscosity is shown. In addition, some of the colloidal aspects of organosol systems have been studied briefly, and several of the preliminary findings are described.

Drying Oils From Xylitol

H. M. Teeter, E. W. Bell, and J. C. Cowan, Northern Regional Research Laboratory, Peoria, Ill. Presented at Div. of Paint, Varnish, and Plastics Chemistry of the American Chemical Society at Chicago Meeting, Sept. 3–8, 1950.

Esters of xylitol with linseed and soybean fat acids have been prepared. Data obtained indicate that an average of four of the five hydroxyl groups in xylitol were esterified and that the remaining group was lost by dehydration. The soybean ester was evaluated in a paint containing basic carbonate white lead as the pigment. In a typical case, drying time measurements on the Sanderson drying machine showed that the paint dried to the "brush-off-sand" point in 4.75 hours, and gave a glossy film which had no tack after 17 hours. These results are superior to those obtainable with a soybean oil and white lead paint of similar composition. However, the paint showed objectionable thixotropy and crawling. These difficulties must be over-

come before the soybean fat acid ester of xylitol can be considered favorably as a drying oil.

Properties of Films From Natural & Synthetic Latices

R. M. Pearson, R. J. Coleman, T. H. Rogers, Jr., D. W. Peabody, and J. D. D'Ianni, Goodyear Tire & Ruber Co., Akron, Ohio. Presented before the Div. of Rubber Chemistry of the American Chemical Society, Sept. 3–7, 1951, New York.

Synthetic butadiene-styrene copolymer latices were prepared for evaluation of their film vulcanizate properties, both alone and in blends with natural rubber. The effects of the following polymerization variables were studied: polymerization temperature; degree of conversion, over range 25 to 95%; latex particle size as polymerized; butadiene-styrene ratio, in range 100/0 to 50/50; and plasticity, in range of Mooney (small rotor) 25 to 100.

Most of the present study of polymer variables has been made on compounded natural-synthetic blends cast as unloaded latex films and vulcanized in an air oven. Some comparisons were made with similar compositions which were mill-mixed and press-cured, or were latex-cast and press-cured without mixing. Stress-strain characteristics and low temperatures behavior have been the principal properties determined on the films.

For a given polymerization temperature and charge ratio, the conversion of the synthetic latex appears to be most important in determining its value as an extender for natural latex. For example, a 60% conversion Type V GR-S latex has considerably better stress-strain properties in 50/50 to 10/90 synthetic-natural ratios than does Type V polymerized to the usual conversion (95%). Above 60% natural rubber the properties of the blends approach each other so closely that the differences are indistinguishable.

The synthetic latices prepared at low temperature (41° F.) gave blends with stress-strain properties superior to those of comparable high temperature (122° F.) polymers. The low temperature flex properties of the blends were superior for the latices reacted at low temperature.

Increasing the styrene content had favorable effects on stress-strain properties and deleterious effects on low temperature properties, in accord with observations of other workers. Increasing the Mooney viscosity improved stress-strain properties when such increases resulted from an increase in the average molecular weight of essentially soluble or loosely cross-linked polymer, but not when the increase was due to the presence of tight gel.

Latices of small particle size which were agglomerated to a large particle size prior to blending gave properties essentially the same as those of latices whose large size was attained in the reactor.

Latices of Flexible Synthetic Polymers

B. M. G. Zwicker, B. F. Goodrich Chemical Co., Cleveland, Ohio. Presented before Div. of Rubber Chemistry of the American Chemical Society, Sept. 3–7, New York.

During the past ten years there has been rapid progress in manufacture and use of flexible synthetic polymers. The merits of water-based systems have been well recognized, and there are now nearly 200 synthetic rubber, plastic, or plasticizable polymer latices commercially available in the United States. These uncompounded products of over thirty manufacturers have been grouped into fifteen classes according to reported polymer composition (five types of rubbers and ten types of plastics).

General properties of synthetic latices are discussed: the effect of particle size on stability and viscosity; characteristics of typical emulsifiers, dispersing and thickening agents and their influence on stability, coagulatability, and application; and wet and dry film strength properties of typical synthetic polymers.

Each class of polymer is discussed with reference to inherent polymer properties and how these are related to principal applications. Good heat, light, and air aging, as well as chemical, oil, grease, and solvent resistance are characteristic of over half the commercial materials. Most synthetic polymers possess substan-

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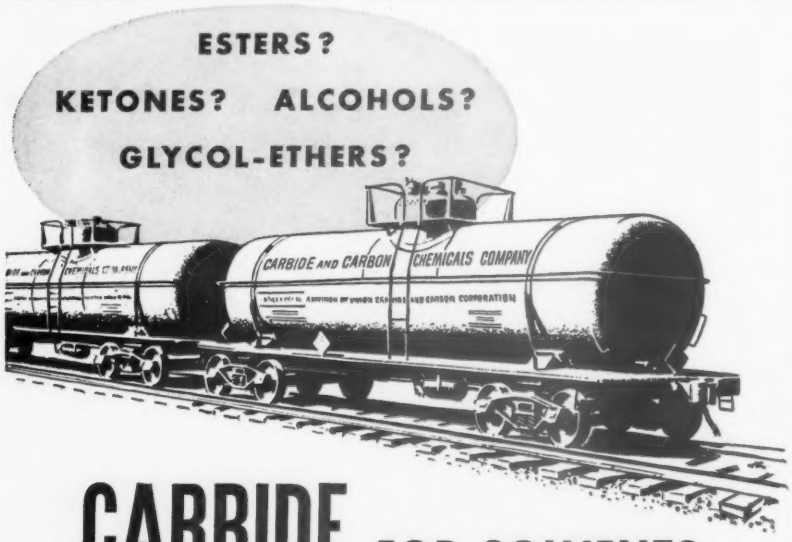
tially higher modulus and less tack than Hevea latex. Water resistance, adhesive and cohesive properties, flexibility, and thermoplasticity can be selected over wide ranges. Many polymers contain polar or chemically reactive groups that impart affinity for cellulose, metals, or other structural materials. These and other specific properties have resulted in many improved or new products in the fields of adhesives (structural, temporary, laminating, fiber and pigment), surface coatings, supported film, unsupported film, foamed sponge and coagulant dipped or molded articles. Certain deficiencies in existing materials are pointed out.

New products entering the market include water-dispersible polymers (for hydrosols), water-soluble polymers (polyelectrolytes and hydrophilic compounds) and plastisols (resins dispersed in plasticizers). These are not discussed in detail, but specific advantages over latex systems are mentioned. Water-dispersible thermosetting resins have not been considered except as compounding ingredients.

G-E Transfers Kneitel To Waterford Plant

Arnold Kneitel of the General Electric Company's Chemical Division has been recently transferred to G.E.'s silicon plant at Waterford, N. Y. as a member of the headquarters' sales organization. Formerly silicone sales representative in the New York area, Mr. Kneitel started with the General Electric Company in 1947 on the chemical and metallurgical training program. Upon completion of this course, he assumed responsibilities as silicone sales representative. A member of the American Chemical Society, Mr. Kneitel is a graduate of Polytechnic Institute of Brooklyn with a bachelor's degree in chemical engineering.



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VINYLS

(*From page 19*)

resin. Pigmentation frequently requires some modification of thinner composition, generally an increase in the amount of dispersant.

An important factor in avoiding oversolvation is temperature control during milling and storage. For organosols, temperatures below 120° F. during milling and storage should be maintained. For most plastisols, milling temperature should be below 80° F., and storage temperature below 60 to 70° F. Care in selecting pigments and stabilizers should follow the rules previously mentioned for vinyl resins. Baking schedules should reach 325° F. for plastisols, and about 350° F. for organosols to obtain maximum film strength. Heavy organosol coatings must not be heated too quickly, in order to avoid blistering, but fast enough to avoid "mud-cracking" and take advantage of the presence of thinner for improved fusion.

Adhesion of dispersion resins to metals, other than by inclusion of VMCH, may be obtained by suitable primers; these must set sufficiently to prevent softening by the solvents or plasticizers of the dispersion resin formulation. The wash primer previously described, based on polyvinyl butyral and phosphoric acid, is recommended. A VYHH primer containing sublimed blue lead may be used after a bake at 350 to 375° F.

A late development is NV.4. resin for use in hydrosols. Present recommendations call for ball-milling the resin with half its weight of DOP or other plasticizer, 1% of its weight of "Superla" wax (a high melting wax which improves smoothness, suspension, flow and water resistance) and stabilizers as required, then adding water and ball-milling for 18 hours; additional plasticizers and pigments, if required, are added in dispersion. An alternate method is to ball-mill resin and water first, and then mill in plasticizer and other components. To control viscosity on application (including prevention of water penetration into a porous substrate) various thickeners may be used (e. g. gelatin, sodium carboxy methylcellulose, ammonium salt of Vinylite SYHM, or some wetting agents) may be used; the amount used should be held to a minimum, and it should only be added after ball-milling. Hydrosols are claimed to be unusually stable.

As far as a summary of all the Vinyl-type resins is concerned, they have little in common, beyond formed by analogous polymerization reactions; many of them show thermoplasticity and intrinsic toughness, due to the linear nature of

the molecules. Among the various polymers discussed, attention should be called to the toughness and chemical resistance of polyethlyene and related compounds. The excellent color and color retention of acrylics, coupled with chemical resistance and the excellent adhesion of polyvinyl butyral based on primers should also be noted.

The vinylic chloride polymers (vinyls in the narrow sense) can be more easily summarized. As a class, they possess intrinsic toughness, and resistance to chemicals and some solvents (alcohols and aliphatic hydrocarbons). They lend themselves to the formulation of highly resistant finishes. The main drawback of these coatings compared to oleoresinous and alkyd finishes, aside from the relatively high cost of dry resin, is the low solid content of solutions, and the high cost of solvent required (ketones and aromatic hydrocarbons). This objection is removed by the dispersion resins, which are applied at high solids content, and in which the diluent, if present at all, consists of low-cost hydrocarbons; a short baking cycle at comparatively high temperature is necessary for dispersion coatings. For many uses, the resistance of vinyl coatings, both solution and dispersion types, warrants their substitution for conventional finishes despite the higher unit cost of vinyls.

References

Textbook Sources

Carleton Ellis—The Chemistry of Synthetic Resins.

Alois X. Schmidt and Charles A. Marlies—Principles of High-Polymer Theory & Practice. Ch. 2, 3.

William von Fischer (Editor)—Paint & Varnish Technology. Authors—H. G. Whitcomb, Eugene W. Kanning.

Technical Periodicals

R. D. Dunlop and F. E. Reese—Ind. Eng. Chem. 40 (Apr. 1948) 654.

Alwyn G. Evans and G. W. Meadown—J. Polymer Science IV (1949) pp. 359–376.

Randall G. Heiligmann—J. Polymer Science IV (1949) pp. 183–202.

E. Jenckel, H. Eckmans geb. Mettegang and B. Rumbach—Die Makromoleculare Chemie IV (1949) (Zurich) p. 15 ff.

Robert E. Lawrence and Elizabeth B. McIntyre—Ind. Eng. Chem. 41 (1949) pp. 689–694.

W. C. Mast and C. H. Fisher—Ind. Eng. Chem. 40 (1948) p. 107 ff.

A. D. McLaren and C. H. Hofrichter Jr.—Paper Trade J. 125 (1947) (9) 96 ff.

C. W. Patton—Vinyl Polymers in Surface Coatings (address to N. Y. Paint & Varnish Production Club. Feb. 1948; Off. Digest, May 1948)

Charles C. Price and David L. Read—J. Polymer Research 1; pp. 44–48, 83–89.

G. M. Powell and R. W. Quarles—Off. Digest 1946, No. 263, pp. 696–702.

M. C. Reed—Ind. Eng. Chem. 35 (1943) p. 896.

M. C. Reed and Leonard Connor—Ind. Eng. Chem. 40 (1948) p. 1414 ff.

M. C. Reed and James Harding—Ind. Eng. Chem. 41 (1949) p. 675 ff.

Walter E. Scheer—Rubber Age 63 (1948) 596.

Richard Wiley and G. M. Brauner—J. Polymer Science 3 (1948) 708.

Manufacturer's Literature

Advance Solvents & Chemical Corp.
American Resinous Chemicals Corp.
Bakelite Corp.
Carbide & Carbon Chemicals Corp.
Commercial Solvents Corp.
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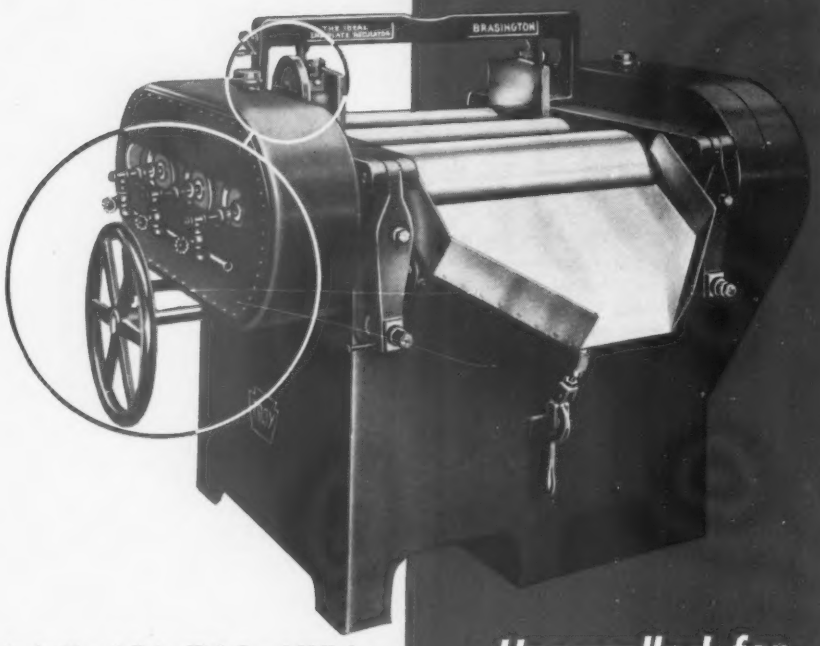

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Jan. 14–17, 1952. Plant Maintenance Show and Conference, Convention Hall, Philadelphia, Pa.

Jan. 22–23. 25th Convention of the Association of American Soap & Glycerine Producers Waldorf-Astoria Hotel, New York.

Mar. 3–7. Spring Meeting of ASTM, Hotel Statler Cleveland.

Mar. 6–7. Spring meeting of the Southern Paint and Varnish Production Club, Buena Vista Hotel, Biloxi, Miss.

Mar. 10–14. Annual Conference of the National Association of Corrosion Engineers, Buccaneer Hotel, Galveston, Tex.

April 3–5. First Pacific Coast Paint Material and Equipment Exhibit, Biltmore Hotel, Los Angeles, Calif.

Production Club Meetings

Baltimore, 2nd Friday, Belvedere Hotel.

Chicago, 1st Monday, Furniture Mart.

C. D. I. C., 2nd Monday.
Cincinnati—Oct., Dec., Mar., May, Cincinnati Club;
Dayton—Nov., Feb., April, Van Cleve Hotel;
Indianapolis — Sept., Claypool Hotel;
Columbus — Jan., June, Fort Hayes Hotel.

Cleveland, 3rd Friday, Hotel Auditorium.

Dallas, 2nd Thursday, No Fixed Place.

Detroit, 4th Tuesday, Rackham Building.

Golden Gate, Last Monday, El Jardin Restaurant, San Francisco.

Houston, 2nd Tuesday, Seven Seas Restaurant.

Kansas City, 2nd Thursday, Pickwick Hotel.

Los Angeles, 2nd Wednesday, Scully's Cafe.

Louisville, 3rd Wednesday, Seelbach Hotel.

Montreal, 1st Wednesday, Queen's Hotel.

New England, 3rd Thursday, Puritan Hotel, Boston.

New York, 1st Thursday, Building Trades Employers Assn.

Northwestern, 1st Friday, St. Paul Town and Country Club.

Pacific Northwest, Annual Meetings Only.

Philadelphia, 3rd Wednesday, Engineers' Club.

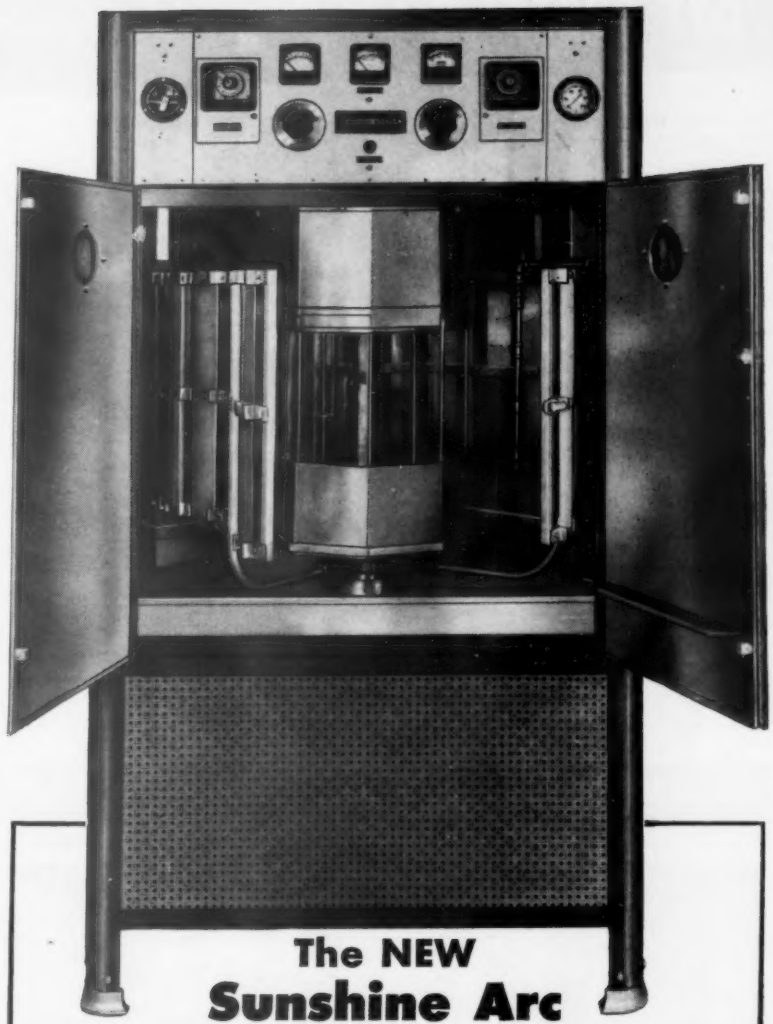
Pittsburgh, 1st Monday, Fort Pitt Hotel.

St. Louis, 2nd Tuesday, Forest Park Hotel.

Southern, Annual Meetings Only.

Toronto, 3rd Monday, Diana Sweets, Ltd.

Western New York, 1st Monday, 40-8 Club, Buffalo.



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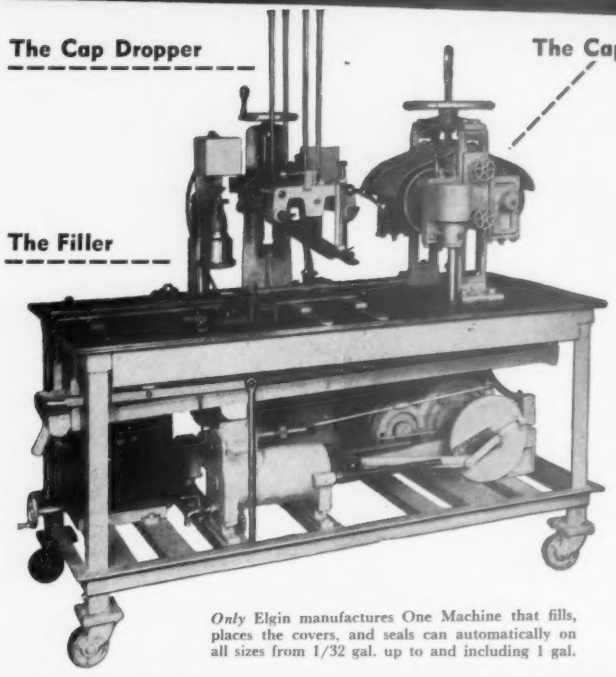

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Patents For Technical Personnel

By Dr. Worth Wade. Published by Chemonomics, Inc., 400 Madison Ave., New York 17, N. Y. Price $3.00.

Without footnotes, case histories, and legal technology, this book simply and accurately discusses what a patent is, lists the steps which must be taken to protect an invention, discusses interference and prosecution of patents, describes a typical patent department of a company and discusses its relation to the inventor-employee, etc. A most important, and so far neglected subject, is found in the last chapter: How to read a patent. Not only does this section clearly analyze the contents of a patent, but therein is presented a systematic method for analyzing and checking claims. A four page pictorial section follows an invention from idea to patent.

This handbook has been written for the inventor and employee of a chemical process plant. Its language is for the layman, not the patent attorney. In its pages are incorporated over twenty years of patent know-how by Dr. Wade. Concise and to the point, this booklet presents a complete, unobstructed picture of patents, their use and functions.

Flatting Agents

U. S. Patent 2,568,599. William A. Weidlich, North Plainfield, and James E. Davis, Bound Brook, N. J., assignors to Interchemical Corporation, New York, N. Y., a corporation of Ohio.

A coating composition which dries to a substantially transparent dull or matte surface, which comprises a normally glossy-drying non-aqueous organic film forming vehicle containing hydrocarbon solvents, the films of which are dulled by the incorporation therein of pigment size particles of a soap of a metal of the class consisting of aluminum, zinc, magnesium and alkaline earth metal salts of an adduct of an alpha beta unsaturated dibasic acid with a terpene, and coated with a film deposited from an aqueous solution of methyl cellulose.

Hydrocarbon Drying Oils

U. S. Patent 2,569,383. George F. Leyonmark, Avenel, and Paul E. Hardy, Elizabeth, N. J., assignors to Standard Oil Development Company, a corporation of Delaware.

In a polymerization process for producing light-colored drying oils, the improvement which consists of making up a polymerization feed comprising mixtures of 70 to 50 weight per cent of propylene monomer and 30 to 50 weight per cent of a conjugated diolefin having 4 to 6 carbon atoms per molecule, and polymerizing the resulting feed at a temperature between +50° C. and +110° C. under a pressure of 50 to 600 lbs./sq. in. in the presence of gaseous boron fluoride, whereby a light-colored, hydrocarbon-soluble drying oil is obtained.

Solubilizing Insoluble and Gelatinized Oils

U. S. Patent 2,568,551. Max Kronstein, New York, N. Y.

A method of solubilizing an at least partially insoluble oil selected from the group consisting of fixed oils and synthetically produced oils containing a higher fatty acid ester of a polyhydric alcohol having more than two hydroxy groups which comprises melting and compounding with said oil a compound comprising a metal soap of a higher fatty

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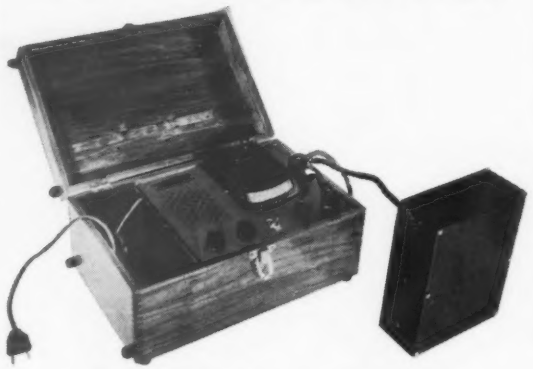

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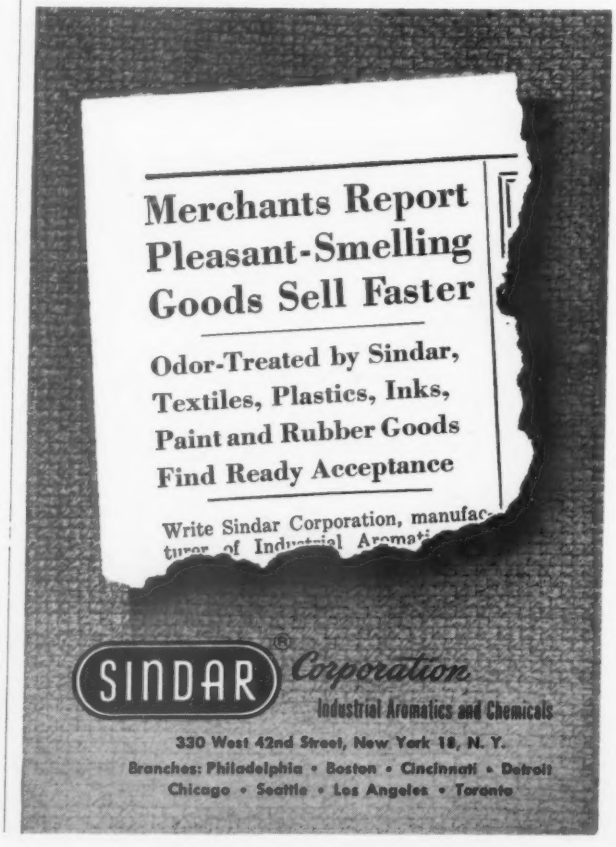
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acid ester of an alcohol having from one to two hydroxy groups at a melting temperature below the decomposition temperature of the resulting composition and at such melting temperature that substantially the entire mass of the resulting composition is melted into the liquid stage, whereby to form a soluble oil reaction product capable of forming a stable solution.

Removing Inhibitors From Drying Oils

U. S. Patent 2,569,206. Henry A. Vogel, Milwaukee, Wis., assignor to Pittsburgh Plate Glass Company, Allegheny County, Pa., a corporation of Pennsylvania.

In a process of treating a drying glyceride oil containing at least .1% of natural drying inhibitors, the steps which comprise incorporating with the oil an organic carboxylic acid salt soluble therein, which salt is of heavy metal that forms fatty acid compounds that accelerate air drying of the oil, the active metal being present in an amount of .0001 to .001 percent, then bubbling gas comprising oxygen through the oil at a rate of .001 to .004 cubic feet of oxygen per minute per gallon of oil treated, the temperature of treatment being within the range of 230 to 280° F., treatment continuing over a period of 10 to 90 minutes whereby to reduce the inhibitor content by 50 to 98%.

Drying Oil Composition

U. S. Patent 2,566,515. Joseph D. Danforth, Grinnell, Iowa, assignor to Universal Oil Products Company, Chicago, Ill., a corporation of Delaware.

A process for the production of a composition of matter having drying properties which comprises co-bodying an unsaturated amine containing at least one alkenyl radical with a drying oil selected from the group consisting of the unsaturated fatty acid ester drying oils, the unsaturated hydrocarbon drying oils, and mixtures of said ester and hydrocarbon types of drying oils at a temperature of from about 150° C. to about 300° C. and for a time sufficient to effect at least partial copolymerization of said amine with said drying oil.

Ethylene Coating Compositions

U. S. Patent 2,567,108. Seymore Hochberg, Upper Darby, Pa., assignor to E. I. du Pont de Nemours and Company, Wilmington, Del., a corporation of Delaware.

A coating composition comprising 1–90% of chromic acid and 10–99% of a homopolymer of unsubstituted ethylene based on the combined chromic acid and homopolymer content.

Liquid Coating Composition

U. S. Patent 2,568,189. John R. Fisher, Jr., Dayton, Ohio, assignor to Industrial Metal Protectives, Inc., Dayton, Ohio, a corporation of Delaware.

A liquid coating composition comprising a dispersion of 16 to 20 pounds zinc dust, the particle size of which is not larger than 6 microns and having an average particle size of 3 microns at least 90 per cent of which is capable of passing through a U. S. standard 400 mesh screen dispersed in 60 to 70 fluid ounces solution containing 50 to 60 per cent low acid resin of the class consisting of melamine formaldehyde resins, phenol formaldehyde resins, phthalic acid-glycerol resin, ester gum resins and dammar gum resins having an acid number not exceeding 7 in said solution, said solution further containing 5 to 25 fluid ounces modified synthetic resin of the class consisting of phenol modified alkyd resin and maleic acid modified alkyd resin ranging from 10 to 40 per cent by weight of the resin content of the entire composition, 16 to 24 fluid ounces solvent and about 1 fluid ounce drier.

Water-in-Oil Type Emulsions

U. S. Patent 2,567,433. Gustaf Bristol Heijmer, Stockholm, Sweden.

A stable emulsion of the water-in-oil type suitable for use as a lacquer and varnish binding agent, said emulsion comprising water as the dispersed phase, a drying oil as the dispersion medium and a water-soluble thermosetting resin

(*Turn to page 47*)

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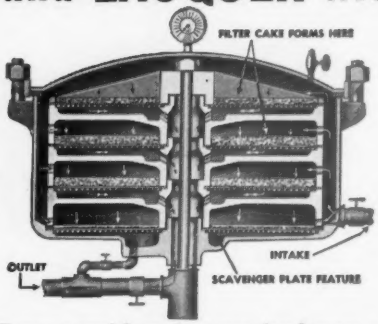

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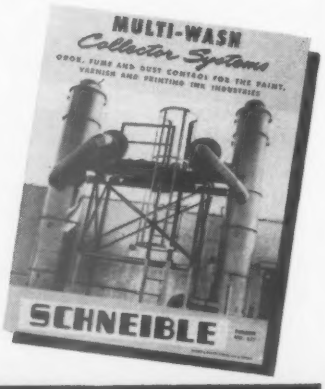

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(*From page 13*)

as the others, since some reached the gel stage before the cooking temperature was attained. These were principally the basic-condensed resins, especially those with a 2:1 formaldehyde-phenol ratio. A top temperature of 480° F. was used so as to be able to cook as many short and medium length varnishes as possible under the same conditions and also to make control for all varnishes easier, as tung oil bodies quite rapidly with most phenolic resins. This temperature appeared to be high enough to give good gasproofing properties to the varnishes.

A comparison of the cooking schedules of the varnishes showed that they varied widely in cooking times. The basic-condensed phenol varnishes which contained the most formaldehyde bodied the fastest, the acid-condensed being next.

Properties

THERE was also quite a variation in drying times, when print-free time was used as the basis for comparison. This time was used as it was believed to be the most reproducible and also was less dependent upon thinners used. Again the basic-condensed phenol varnishes containing the most formaldehyde were the fastest to dry, with, however, the acid-condensed being the slowest. The drying time range was from two to ten hours for most varnishes. The 50 gallon varnishes dried the most rapidly, with the 10 gallon varnishes being slightly slower to dry, in general, than the 30 gallon ones. However, due to probable incomplete cooking of some of the basic-condensed resin varnishes, these results are not considered conclusive. The acid-condensed phenylphenol varnishes were outstanding for rapidity of dry in all oil lengths.

The measurement of color was a difficult problem. The initial color of the varnishes was measured by comparison with the Gardner Color Standards of 1933. The final color was determined by a visual comparison of the films after three weeks drying time on white porcelain panels. The results were quite significant: whereas initially the acid-

condensed resin varnishes were the lightest and the 1:1 basic-condensed the darkest, after drying and aging in the dark, the 2:1 basic-condensed phenol varnishes were the lightest with the acid-condensed ones the darkest. The reversal was due to the rapid darkening of the acid-condensed resin varnishes, not to any lightening of the others. The best example of the lack of color stability is provided by the varnish made from the acid-condensed cresol resin. Whereas it originally was the lightest varnish, the final color of its dried film was darker than all the others. Hence it is fairly conclusive that the basic-condensed resins, while not initially the palest ones, produce the most color stable varnishes.

On the other hand, it was the acid-condensed phenol varnishes that showed the greatest water and alkali resistance. All the varnishes described herein exhibited outstanding water resistance, since exposure to boiling water for one week did not injure any of the films. Results of exposure to 5% sodium hydroxide solution at room temperature showed that the acid-condensed resin varnishes were far superior to the others. Among the basic-condensed resin varnishes, the ones which contained more formaldehyde were the less resistant. The 50 gallon varnishes had very poor alkali resistance. This is doubtless due to the low resin content which leaves the oil more subject to attack by the alkali. It is of interest to note that the average life of the acid-condensed resin varnish films of 10 and 30 gallon oil lengths in the caustic solution was about three weeks of continuous exposure.

Hardness comparisons of the varnish films were also investigated. While no good correlation among the phenols was evident, the short oil varnishes produced the hardest films and the long oil varnishes the softest, as would be expected. The butylphenol varnishes were among the best in all cases. The Sward hardness varied from a low of 4 for some acid-condensed resin varnishes to a high of over 40 for a basic-condensed butylphenol varnish of 10 gallon oil length.

Very few of the varnishes skinned. The notable exceptions were the basic-condensed butylphenol and the acid-condensed phenylphenol varnishes. However, this could easily be corrected by the addition of a small amount of an anti-skinning agent.

The results of this investigation make it apparent that no one resin produces a varnish that is superior in all respects to the others. Some property must be sacrificed in order to obtain another more highly desirable one. Whereas, for example, the 2:1 basic-condensed resin varnish may produce the palest film, an acid-condensed resin varnish will give the best water and alkali resistance. Hence the varnish or enamel formulator must bear in mind the specifications for his product and the conditions under which it is to be used in order to make an intelligent selection among the many phenolic resins that are available commercially.

Acknowledgment

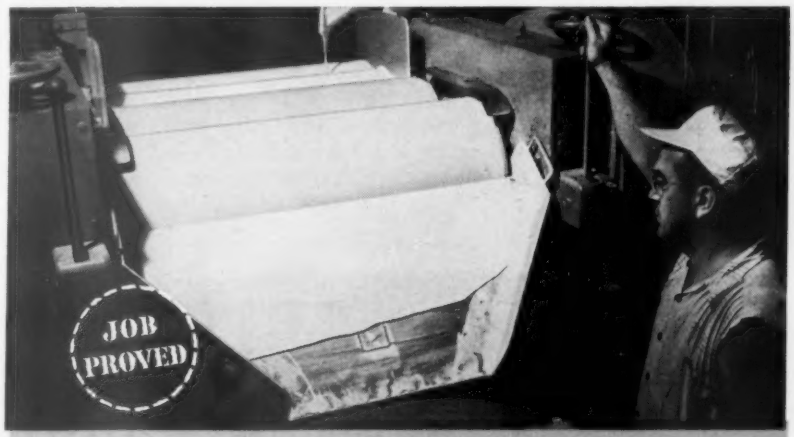
The author wishes to thank William D. Wagner, Jr. for information supplied on 10 and 50 gallon oil length varnishes which was used herein.

G-E Adds Two to Development Lab

Two chemical engineers have joined the Process Development Laboratory of the General Electric's Chemical Division.

Robert L. Hatch, a chemical engineer with the Standard Oil Company (Indiana) for three years, received a bachelor's degree in chemical engineering from Rensselaer Polytechnic Institute in 1945 and a master's degree from Massachusetts Institute of Technology in 1947.

Stanley Seltzer, a teaching fellow in the Department of Chemical and Metallurgical Engineering at the University of Michigan for two years, received his bachelor's degree in chemical engineering from Cooper Union in 1947.



INVENTORY PROBLEM SOLVED

Versatility of Sun Spirits Provides Paint Maker With One Dependable, All-Purpose Solvent

A manufacturer of commercial and industrial paints could not find an all-purpose thinner. He tested many solvents over the years. Every one he tried was either limited in use to specific products or too low in solvency. Not one maintained uniform quality. Lacking an answer to his problem, he was forced to carry a large inventory. But this proved unwieldy and frequently upset production. For example, a solvent tagged for one kind of batch all too often turned up in another.

Then one of our representatives introduced him to Sun Spirits To his delight he found it to be the all-purpose thinner he sought. By using it exclusively he cut down his tankage. This, incidentally, reduced his fire insurance and his taxes. Today, 21 years later, this satisfied customer points out that the quality of Sun Spirits always remains uniform and dependable.

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TECHNICAL Bulletins

PHOSPHATE COMPOUNDS

Eight-page booklet is devoted to "Anchorite 100," a phosphatizing compound that changes the surface of steel, iron, zinc and cadmium parts into an inert phosphate coating which prevents corrosion. The booklet further describes causes of paint failures and ways of preventing such failures. Octagon Process, Inc., 15 Bank St., Staten 1, N. Y.

PLATE FABRICATION

An eight-page illustrated bulletin is offered by The Colonial Iron Works Co., Cleveland, Ohio, to show their engineering and fabricating facilities for a wide variety of tanks, kettles, towers, reactors and similar equipment. Photographs show numerous views of fabricating operations, machinery and completed products.

CONTROLLERS

A new bulletin, #1320, on TAG Self Operated temperature and pressure controllers is now available from Tagliabue Instruments Division, Weston Electrical Instrument Corporation, Dept. 67, 614 Frelinghuysen Avenue, Newark 5, New Jersey.

TRACTION SYSTEM

Designed for plant superintendents who want to speed up the handling of heavy finished goods or raw materials to and from loading platforms, store rooms, and production, this catalog illustrates various traction systems offered by Engineering Products Co., Inc., 122 South Michigan Ave., Chicago 3, Ill.

MONOGLYCERIDES

"Monoglycerides Finding Wider Uses in Industry" is the title of a reprint of an article that is available from the Glyco Products Co., Inc., Brooklyn 2, N. Y.

This describes monoglycerides of the fatty acids such as stearic, oleic, lauric, ricinoleic, etc. Methods of manufacture are discussed. The varying compositions and physical properties which are possible are outlined and a specifications chart to illustrate this is included.

SORBITOL

22-page booklet describes sorbitol and related polyols and their uses in various industries. In connection with their uses in protective coatings subjects covered in detail are hard gums, uniphase varnishes, tall oil esters and alkyds. Atlas Powder Co., Wilmington, Del.

PHTHALOCYANINE BLUE

Calco Chemical Div., American Cyanamid Co., Bound Brook, N. J. has issued a technical bulletin No. 902 entitled "Phthalocyanine Blue." The pamphlet contains 11 pages and includes charts, diagrams and microphotographs. This is a reprint of talk delivered by F. T. Tarantino, D. H. Stubbs, T. F. Cooke and L. A. Melsheimer.

(*Turn to page 49*)

How to Lick the
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LET THE THREE GLIDDEN GUARDSMEN SHOW YOU HOW TO PREVENT THE SKINNING OF PAINTS AND VARNISHES
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2775 East 132nd St. at Shaker Square, Cleveland 20, Ohio
503 Market Street, San Francisco 5, Calif.

PATENTS

(*From page 43*)

as the emulsifying agent, said resin being selected from the group consisting of urea-formaldehyde and melamine-formaldehyde resins.

Coating for Metal Surfaces

U. S. Patent 2,568,424. Charles T. Watson, Bessemer, Ala., assignor of Tennessee Coal, Iron and Railroad Company, a corporation of Alabama.

A protective paint for metal surfaces comprising from ⅓ to ½ solids by weight suspended in a water insoluble film-forming vehicle, said solids consisting of from 15 to 40% by weight of a phosphate of a metal from the group consisting of iron, manganese and zinc, and substantially the balance inert filler.

Method of Testing Wax

U. S. Patent 2,562,902. Karl A. Fischer, Washington, D. C.

The method of determining the oil content of waxes by the addition of an oil soluble and crystallizable dye stuff which is soluble in liquid wax and insoluble in crystallized wax, comprising incorporating an oil-soluble dye in a liquid wax material, solidifying the wax, and determining the color change of the dye.

Treating Oils

U. S. Patent 2,567,106. John R. Fisher, Jr., Dayton, Ohio, assignor to The Commonwealth Engineering Company of Ohio, Dayton, Ohio, a corporation of Ohio.

In a method of treating fatty vegetable drying oils, the step of exposing the oil to a high-frequency electric field of substantially 9 megacycles and 0.7 ampere for two hours.

LANCASTER, ALLWINE & ROMMEL
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●
Suite 424, 815—15th St., N.W.
Washington 5, D. C.
Patent Practice before U. S. Patent Office. Validity and Infringement Investigations and Opinions.
Booklet and form "Evidence of Conception" forwarded upon request.

Fire-Retardant Paints

U. S. Patent 2,566,964. Herman A. Scholz, Evanston, and Earl E. Saville, Palatine, Ill., assignors to United States Gypsum Company, Chicago, Ill., a corporation of Illinois.

A water-soluble fire-retardant coating composition comprising from about 10% to about 30% of a potentially hardenable water-soluble aminoplast resin, from about 30% to about 50% of acid-reacting ammonium phosphates, and sufficient of a mixture of substantial quantities each of at least two pigments to make a total of 100%, one of said pigments being selected from the group consisting of barytes, gypsum, lithopone, zinc sulfide, and titanium oxides, and the other selected from the group consisting of silica, clay, pyrophyllite, talc and mica.

GE Recent Appointments

The General Electric Company's Chemical Department has announced several new appointments to their New Products Development Laboratory in Pittsfield, Mass.

Phiroze D. Shroff has been appointed development chemist. Formerly doing research work at Michigan State College, he received a B.S. in chemistry from the Royal Institute of Science in 1946, an M.S. in chemistry from the University of Bombay (India) in 1948, and an M.S. and PhD in chemical engineering from Michigan State College.

Joseph C. Caprino, Robert J. Prochaska, and John M. Tome, Quintin P. Cole, and Milton Wolf have been appointed research chemists.

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SUBJECT INDEX for VOLUME 41
January–December, 1951

	Issue	Page
Army Ordnance, Protective Coating Research	May	12
Bureau of Ships, Protective Coatings Research by	April	13
Cables and Pipes, Coatings for Underground	Aug.	8
Cathodic Protection, The Use of, With Conventional Paint Systems	May	8
Caulking Compounds, Aspects in the Formulation of	June	17
Coatings, Dimer Acid in Surface	Aug.	20
Coating Films, Strength of	Jan.	19
Coatings Materials Industry, Development and Research in the		
Part I	Oct.	31
Part II	Nov.	24
Coatings for Protection of Steel in Water	Mar.	10
Coatings for Underground Cables and Pipes	Aug.	8
Coatings, Vinyls for Surface		
Part I	Feb.	17
Part II	May	25
Part III	July	12
Part IV	Sept.	22
Part V	Dec.	14
Dimer Acid in Surface Coatings	Aug.	20
Drying and Non-Drying Oils, Comparative Bulk Oxidation	April	19
Electrographic Printing, Color Effect in	Sept.	19
Emulsion Waxes	Jan.	14
Film Forming Materials, Investigation on the Solid State, Part I	April	8
Film Forming Materials, Investigation on Catalytic Solidification, Part II	May	17
Films, Strength of Surface Coatings	Jan.	19
Finishes Automotive, Factors Affecting the Testing of	Sept.	13
Finishing Problems—Sinkage in Wood Finishing—Its Cause and Cure through Formulation	Oct.	27
Fungal Requirements in Government Specifications	Nov.	16
General Service Administration, Important Role of	June	24
Hygiene, Industrial, in the Paint Factory	July	8
Instrumentation, Results in Uniform, Reproducible Varnishes	Feb.	12
Lacquer Finishes (Thinners) A Study of	Oct.	23
Lacquer, Hot	Feb.	21
Lacquers, Metal, Special Shellac in	June	10
Lead, Red in Paints for Metal Protection	Jan.	8
Marine Organisms, Penetration of Protective Coatings by	July	17
Metal Protective Red Lead Paints	Jan.	8
Mildewing of Paints and Its Prevention	Feb.	8
National Bureau of Standards, Paint Research at	Aug.	17
Organisms, Marine, Penetration of, in Protective Coatings	July	17
Oxidation of Drying and Non-Drying Oils, Bulk	April	19
Paint Industry, Reflections of, at Mid-Century	Oct.	14
Paints, Mildewing of, and its Prevention	Feb.	8
Paints, Red Lead, for Metal Protection	Jan.	8
Paint Research at National Bureau of Standards	Aug.	17
Paints for Submerged Surface, Role of Vehicle	Mar.	14
Paint Systems, The Use of Cathodic Protection	May	8
Paint and Varnish Industry, Rotary Pumps for	June	8
Phenolic Resins and Their Varnishes	Dec.	12
Plant, New Modern, for General Paint Company	June	20
Protection of Metals, Importance of Surface Preparation for	Mar.	18
Protection of Steel in Water, Coatings for	Mar.	10
Protective Coating Research by U. S. Army Ordnance	May	12
Protective Coatings Research by the Bureau of Ships	April	13
Protective Coatings, The Penetration of, by Marine Organisms	July	17
Protective Coating for Submersible Type Transformers and Network Protectors	Mar.	24
Pumps, Rotary, for the Paint and Varnish Industry	June	8
Surface Preparation, Importance of	Mar.	18
Shellac, Special, in Metal Lacquers	June	10
Sinkage in Wood Finishing—Its Cause and Cure Through Formulation	Oct.	27
Testing, Factors Affecting, of Automotive Finishes	Sept.	13
Vehicle, Role of, in Paints for Submerged Surfaces	Mar.	14
Wax Emulsions	Jan.	14
Varnish, Instrumentation Results in Uniform and Reproducible	Feb.	12
Vehicle, Role of, In Paints for Submerged Surfaces	Mar.	14
Vinyl Coatings, Evaluation of, for Surfaces Subject to Fresh Water Immersion	July	19
Vinyls for Surface Coatings		
Part I	Feb.	17
Part II	May	25
Part III	July	12
Part IV	Sept.	22
Part V	Dec.	14

AUTHOR'S INDEX for VOLUME 41
January–December, 1951

	Issue	Page
Clapp, William		
The Penetration of Protective Coatings by Marine Organisms	July	17
Elm, A. C.		
Role of Vehicle in Paints for Submerged Surfaces	Mar.	14
Figliolino, Anthony		
Aspects in the Formulation of Caulking Compounds	June	17
Wax Emulsions	Jan.	14
Galassi, Michael and James, R. W.		
Use of Special Shellac in Metal Lacquers	June	10
Goebel, C. G. and Moore, D. T.		
Dimer Acid in Surface Coatings	Aug.	20
Golding, Barge		
Phenolic Resins and Their Varnishes	Dec.	12

Gottfried, W. A. and Machlowitz, R. A.
A Study of High Quality Lacquer Finishes (Thinners) ..... Oct. 23
Grinsfelder, Henry
Strength of Surface Coating Films ..... Jan. 19
Hanau, Walter J.
Vinyls for Surface Coatings
Part I ..... Feb. 17
Part II ..... May 25
Part III ..... July 12
Part IV ..... Sept. 22
Part V ..... Dec. 14
Heiberger, Philip and Morris, Stanley S.
Reflections of the Paint Industry at Mid-Century ..... Oct. 14
Hess, P. S. and O'Hare, G. A.
Comparative Bulk Oxidation of Drying and Non-Drying Oils ..... April 19
James, R. W. and Galassi, Michael
Use of Special Shellac in Metal Lacquers .... June 10
Kulman, E. F.
Coatings for Underground Cables and Pipes . Aug. 8
Kronstein, Max
Color Effects in Electrographic Printing .... Sept. 19
Film Forming Materials Investigation on the Solid State, Part I ..... April 8
Film Forming Materials Investigation on Catalytic Solidifiation, Part II ..... May 17
Letsky, B. M.
Improved Solutions to Finishing Problems—Sinkage in Wood Finishing—Its Cause and Cure Through Formulation ..... Oct. 27
Liebman, A. J.
Importance of Surface Preparation for Protection of Metals ..... Mar. 18
Machlowitz, R. A. and Gottfried, W. A.
A Study of High Quality Lacquer Finishes (Thinners) ..... Oct. 23
Manowitz, Milton and Vicklund, Richard E.
Mildewing of Paints and Its Prevention .... Feb. 8
McMaster, Wardley D. and Wirshing, Ralph J.
Factors Affecting the Testing of Automotive Finishes ..... Sept. 13
Moore, D. T. and Goebel, C. G.
Dimer Acid in Surface Coatings ..... Aug. 20
Morris, Stanley S. and Heiberger, Philip
Reflections of the Paint Industry at Mid-Century ..... Oct. 14
O'Hare, G. A. and Hess, P. S.
Comparative Bulk Oxidation of Drying and Non-Drying Oils ..... April 19
Oxley, G. W.
Coatings for Protection of Steel in Water .. Mar. 10
Procopi, J.
Instrumentation Results in Uniform, Reproducible Varnish ..... Feb. 12
Richman, Elliot M.
Rotary Pumps for the Paint and Varnish Industry ..... June 8
Rohwedder, J. L. and Shanks, F. W.
Evaluation of Vinyl Coatings for Surfaces Subject to Fresh Water Immersion ..... July 19
Ruggeri, Sam
Fungal Requirements in Government Specifications ..... Nov. 16
Shanks, F. W. and Rohwedder, J. L.
Evaluation of Vinyl Coatings for Surfaces Subject to Fresh Water Immersion ..... July 19
Stern, Arthur C.
Industrial Hygiene in the Paint Factory .... July 8
Sudrabin, L. P.
The Use of Cathodic Protection With Conventional Paint Systems ..... May 8
Wirshing, Ralph J. and McMaster, Wardley D.
Factors Affecting the Testing of Automotive Finishes ..... Sept. 13
Woodruff, Howard C.
Development and Research in the Coatings Materials Industry
Part I ..... Oct. 31
Part II ..... Nov. 24
Vander Valk, C. J.
Metal Protective Red Lead Paints ..... Jan. 8
Veit, V. A.
Protective Coating for Submersible Type Transformers and Network Protectors .... Mar. 24
Vicklund, Richard E. and Manowitz, Milton
Mildewing of Paints and Its Prevention .... Feb. 8

BULLETINS

(*From page 46*)

MATERIALS HANDLING EQUIPMENT

Using a system of visual cross reference charts, a new condensed catalog offered by the Industrial Truck Division of Clark Equipment Company, Battle Creek, Michigan, makes all essential model and attachment information available at a glance.

Broken down, page by page, the catalog shows specifications by model and capacity for both gas and electric fork-lifts with cushion-type tires and pneumatic tires. Similar treatment is given to Clark towing tractors and the new powered hand trucks, hand pallet trucks, hand platform trucks, and hand stackers.

MATERIAL HANDLING SELECTION

A 28-page catalog that makes it easy for any firm to select the right type of conveyors, trucks, and industrial casters has been published by The Rapids-Standard Company, Inc. of Grand Rapids, Michigan. The new catalog has hundreds of photos, sketches and charts that show what each item of Rapidstan equipment is, how it works, and what type of material it will handle.

SILICONE REPELLENT

Seven page data sheet is concerned with the advantages and limitation, performance, preparation and application methods of silicone resin "XR-129" which is used as a water repellent for masonry. Dow Corning Corp., Midland, Mich.

METALLIC SOAPS

Booklet gives information about metallic soaps, uses, properties, analysis, and references. Metasap Chemical Co., Harrison, N. J.

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PROPERTIES OF BUTANOL AND BUTYL ACETATE

	Butanol	Butyl Acetate
Molecular Weight (calc.):	74.12	116.16
Specific Gravity at 20/20°C:	0.810—0.813	0.872—0.880
Pounds per U. S. Gallon at 68°F:	6.756	7.30
Coefficient of Cubical Expansion, per 1°F:	0.00052	0.00067
per 1°C:	0.00093	0.00121
Boiling Point at 760 mm, °C:	117.7	126.5
Vapor Pressure at 20°C, mm:	4.3	10.1
Product-Water azeotrope, Boiling Point, 760 mm, °C:	92.7	90.5
Proportion of Product, % by weight:	57.6	72
Melting Point, °C:	—89 (approx.)	—76.8
Refractive Index, nd at 20°C:	1.3993	1.3947
Flash Point, Tag Open Cup:	116°F	102°F
Solubility in Water at 25°C, % by vol.:	8.9	0.5
Solubility in Water of Product at 25°C, % by vol.:	17.12	1.6

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ADVERTISER'S INDEX

Advance Solvents & Chemical Corp. ..... Front Cover
Alkydol Laboratories, Inc. . 47
American Can Co. ..... Nov.
American Chemical Paint Co. 32
American Zinc Sales Co. 3d Cover
Atlas Electric Devices 39
Atlas Powder Company .. 43
Bakelite Company, a Division of Union Carbide and Carbon Corporation 29
Barrett Div., Allied Chemical & Dye Corp. 48
Binney & Smith Co. 4th Cover
Godfrey L. Cabot, Inc. ... Nov.
John Calo Co. 41
Carbide & Carbon Chemicals Co., A Div. of Union Carbide & Carbon Corp. 42
E. W. Colledge, G.S.A., Inc. 46
Commercial Solvents Corp. 50
Concord Mica Corp. ..... Nov.
Continental Can Company Nov.
Coors Porcelain Co. 3
Cuno Engineering Co. .... Nov.
The Davies Can Co. 40
The Davison Chemical Corp. 35
Dicalite Division, Great Lakes Carbon Corp. .... Nov.
E. I. Du Pont De Nemours & Co., Inc. ..... Nov.
Edgar Bros. Co. ..... Nov.
Elgin Manufacturing Co. .. 40
The English Mica Co. 50
Falk & Co. ..... Nov.
A. Gross & Company 11
W. C. Hardesty Co., Inc. .. Nov.
Harshaw Chemical Co. ... Nov.
Hercules Powder Co. 34
Kentucky Color & Chemical Co. ..... Nov.
Landes, Zachary & Peterson 3
Lead Industries Association 8
Mapico Color Div., Columbian Carbon Corp. 4th Cover
Metals Disintegrating Co. .. Nov.
McCloskey Varnish Co. ... Nov.
Naftone, Inc. 3
The Neville Company ..... Nov.
Newport Industries, Inc. ... Nov.
Nuodex Products Co. ..... Nov.
Pan American Refining Corp., Pan American Chemicals Div. ..... Nov.
Photovolt Corp. 48
R. B. H. Dispersions, Division of Interchemical Corp. .. Nov.
Reichhold Chemicals, Inc. 2nd Cover
Shell Chemical Corp. 4
Claude B. Schneible Co. ... 49
Sindar Corp. 48
Sparkler Manufacturing Company 49
Sun Oil Co. 45
Titanium Pigment Corporation 6
Troy Engine & Machine Co. 38
Union Carbide and Carbon Corporation, Bakelite Company 29
Union Carbide & Carbon Corp., Carbide & Carbon Chemicals Co. 42
United Carbon Co. 46
U. S. Industrial Chemicals, Inc. 10
U. S. Stoneware Co. 33
Velsicol Corp. 31
C. K. Williams & Co. 37
Wyandotte Chemicals Corporation ..... Nov.

high

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A medium oil absorption Acicular Zinc Oxide imparting exceptional weathering qualities to exterior paints

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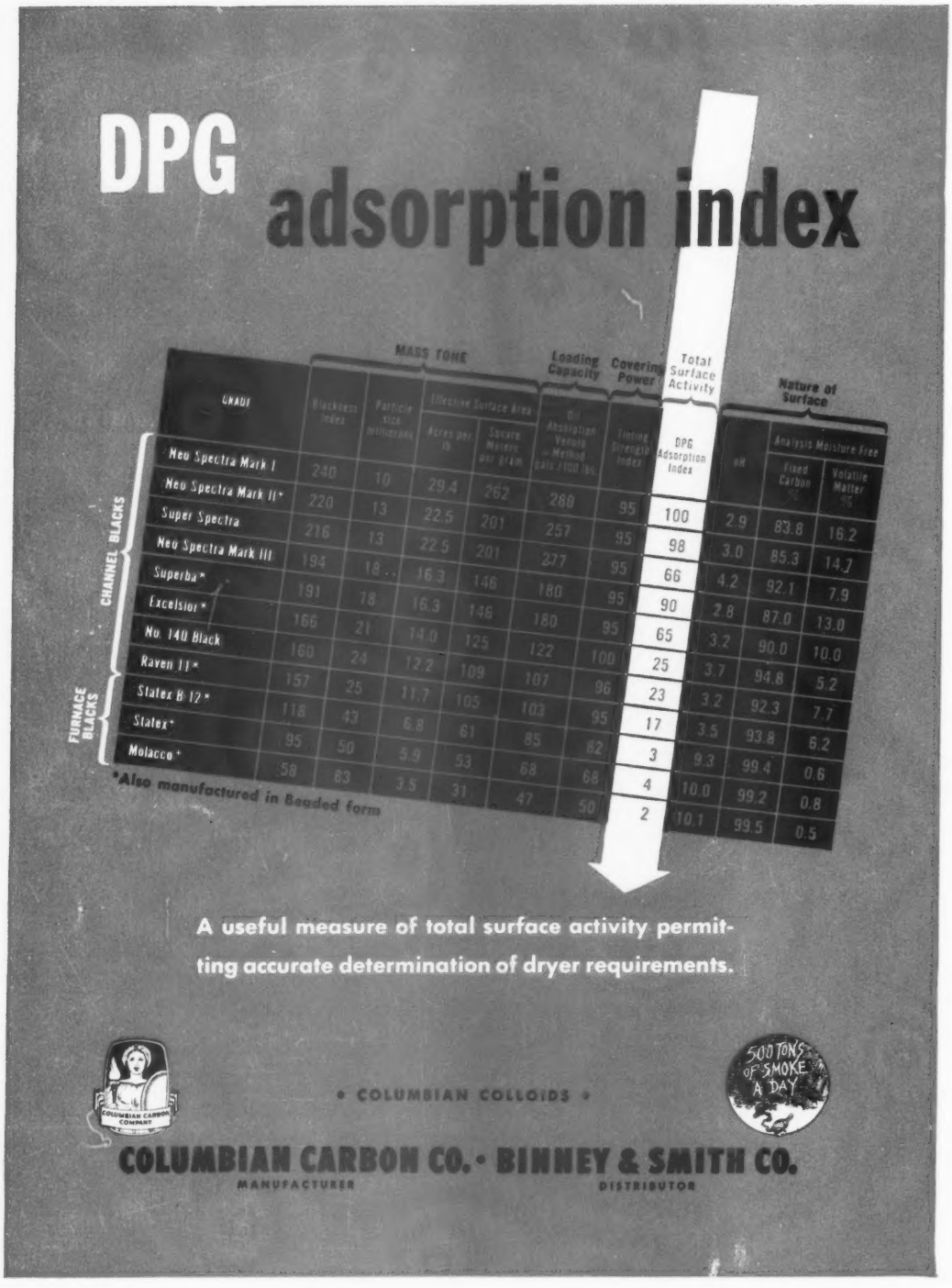
DPG adsorption index
MASS TONE
Loading Capacity
Covering Power
Total Surface Activity
Nature of Surface
GRADE
Blackness Index
Particle size millimicrons
Effective Surface Area
Acres per lb
Square Meters per gram
Oil Absorption Gardner Method gals./100 lbs.
Tinting Strength Index
DPG Adsorption Index
pH
Analysis Moisture Free
Fixed Carbon %
Volatile Matter %
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FURNACE BLACKS
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Super Spectra 216 13 22.5 201 277 95 66 4.2 92.1 7.9
Neo Spectra Mark III 194 18 16.3 146 180 95 90 2.8 87.0 13.0
Superba* 191 18 16.3 146 180 95 65 3.2 90.0 10.0
Excelsior* 166 21 14.0 125 122 100 25 3.7 94.8 5.2
No. 140 Black 160 24 12.2 109 107 96 23 3.2 92.3 7.7
Raven 11* 157 25 11.7 105 103 95 17 3.5 93.8 6.2
Statex B-12* 118 43 6.8 61 85 82 3 9.3 99.4 0.6
Statex* 95 50 5.9 53 68 68 4 10.0 99.2 0.8
Molacco* 58 83 3.5 31 47 50 2 10.1 99.5 0.5
*Also manufactured in Beaded form
A useful measure of total surface activity permitting accurate determination of dryer requirements.
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